SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2553.—VOL. LIV. LONDON, SATURDAY, JULY 26, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

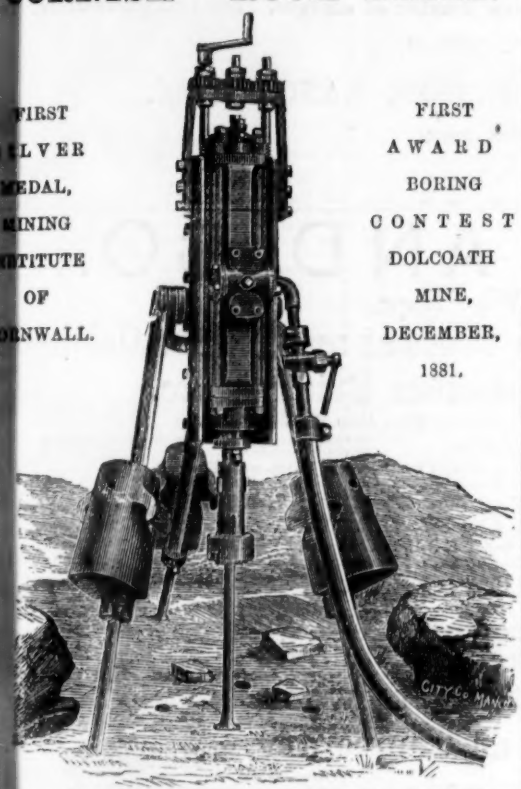
1ST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC —Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air.

JUBILEE EXHIBITION, 1882.

THE PATENT

"CORNISH" ROCK DRILL.

FIRST SILVER MEDAL, MINING INSTITUTE OF CORNWALL.



FIRST AWARD BORING CONTEST DOLCOATH MINE, DECEMBER, 1881.

Prices and particulars on application to the Manufacturers,

HOLMAN BROTHERS,

CAMBORNE FOUNDRY AND ENGINE WORKS, CAMBORNE, CORNWALL.

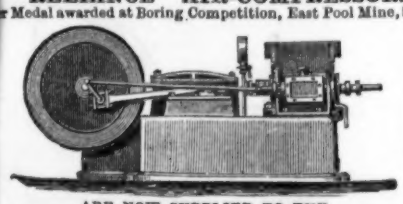
ENGINES, AIR COMPRESSORS, TUNNELLING CARRIAGES, TRIPODS, &c.,

From own design, or to order.

THE PATENT

"ECLIPSE" ROCK-DRILL AND "RELIANCE" AIR-COMPRESSOR.

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.



ARE NOW SUPPLIED TO THE

ENGLISH, FOREIGN, AND COLONIAL GOVERNMENTS

And are also in use in a number of the

LARGEST MINES, RAILWAYS, QUARRIES, AND HARBOUR WORKS IN GREAT BRITAIN AND ABROAD

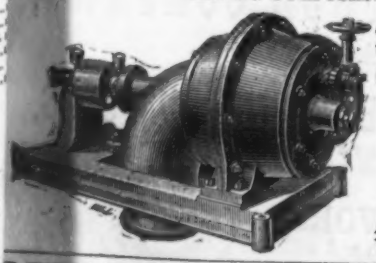
FOR ILLUSTRATED CATALOGUE AND PRICES, apply to—

HATHORN & CO., 22, Charing Cross, London, S.W.

WATER POWER,

UTILISED WITH THE GREATEST ECONOMY AND EFFECT BY THE PATENT "TRENT" TURBINE.

As arranged, with a horizontal spindle, it is specially adapted for MINING PURPOSES.



Catalogues on application to the sole British Maker,

C. L. HETT,

ANCHOLME FOUNDRY, BRIGG, ENGLAND.

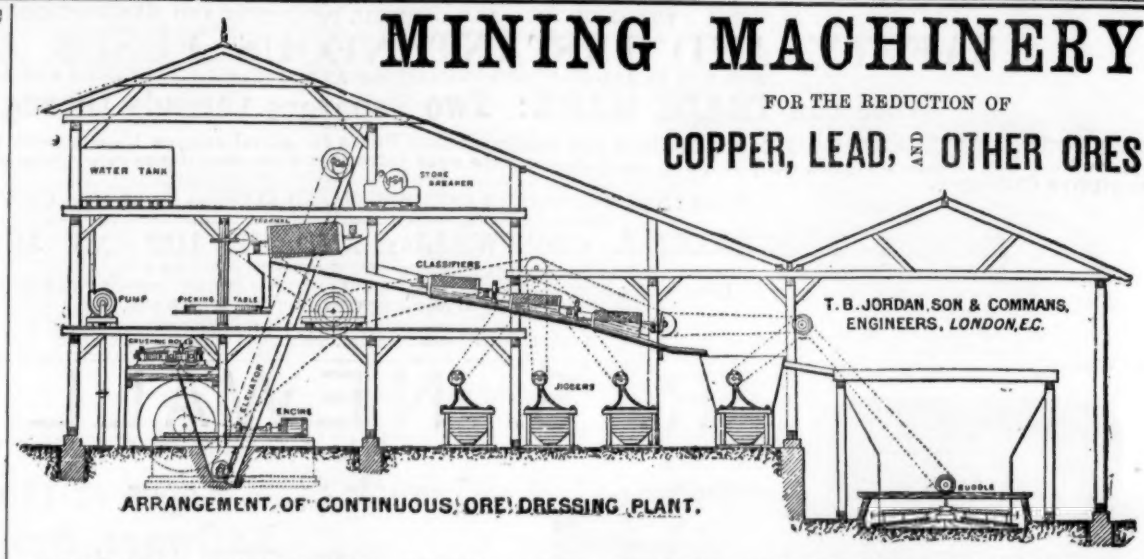
The Patent Trent, New American Hercules, & Victor Turbines.

MONEY LENT, at EIGHT, NINE, and TEN PER CENT., on FIRST MORTGAGE of FREEHOLDS for IMPROVEMENTS and BUILDING, said freeholds in the Province of MANITOBA. Address, HERBERT C. JONES, Solicitor, 20, Masonic Hall, Toronto

MINING MACHINERY

FOR THE REDUCTION OF

COPPER, LEAD, AND OTHER ORES



ARRANGEMENT OF CONTINUOUS ORE DRESSING PLANT.

JORDAN'S IMPROVED GOLD AND SILVER REDUCING MACHINERY, PATENT PULVERIZERS, AND ROCK DRILLING PLANT, &c., &c.

T. B. JORDAN, SON, and COMMANS, 52, Gracechurch St., London, E.C.

PATENT

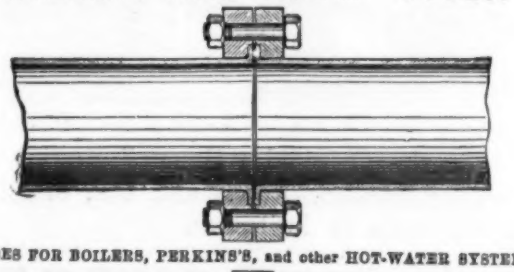
"INGERSOLL ROCK DRILL."

MEDAL AND HIGHEST AWARDS.

1872—American Institute.
1873—Ditto.
1874 — London International.
1875—Manchester.
1875—Leeds.
1875—Cornwall.
1875—Rio de Janeiro.
1876—Australia.
1876—Philadelphia.
1877—Cornwall.
1877—Mining Institute.
1878—Paris.

We claim 40 per cent. greater effective drilling power.

WROUGHT-IRON STEAM TUBES.



TUBES FOR BOILERS, PERKINS'S, and other HOT-WATER SYSTEMS.

For Catalogues of Rock Drills, Air Compressors, Steel or Iron Steam Tubes, Boiler Tubes, Perkins's Tubes, Pneumatic Tubes, Boring Tubes, and all kinds of Machinery and Mining Plant, apply to—

LE GROS, MAYNE, LEAVER & CO.

60, Queen Victoria Street, London, E.C.

STEPHEN DAVISON,

TIMBER MERCHANT, MORPETH,

Wishes to correspond with Company Promoters to establish Company to purchase land formerly occupied by an extensive Timber firm near Morpeth Station.

To carry on the Business as TIMBER MERCHANTS, SAW MILL PROPRIETORS, and GENERAL WOOD TURNERS.

First-class situation. Railway alongside. Certain to pay a large dividend.

BUSINESS READY MADE.

THE COLLIERY READY-RECKONER AND WAGES CALCULATOR.

By JAMES IRELAND

"Will be the means of preventing many disputes between pay clerks and colliers."—*Mining Journal.*

To be had on application at the MINING JOURNAL Office, 26, Fleet-street, E.C.

THE

"Barrow" Rock Drill

COMPANY.

HOSKING AND BLACKWELL'S PATENT.

SUPPLY their CELEBRATED ROCK DRILLS, AIR COMPRESSORS, &c., and all NECESSARY APPLIANCES for working the said Drills.

The DRILLS are exceedingly STRONG, LIGHT, SIMPLE, and adapted for ends stopes, quarries, and the sinking of shafts. They can be worked by any miner

Their DRILLS have most satisfactorily stood the TEST of LONG and CONTINUOUS WORK in the HARDEST KNOWN ROCK in numerous mines in Great Britain and other countries clearly proving their DURABILITY and POWER.

About 200 are now at work driving from three to six times the speed of hand labour, and at from 20 to 30 per cent. less cost per fathom. They can be worked by any miner.

For PRICES, Particulars and Reports of Successful and Economical Working, apply to—

LOAM AND SON,

LISKEARD, CORNWALL.

THE PATENT

"Cranston" Rock Drill,

AIR COMPRESSOR, AND DEEP BORING MACHINERY.

For prices, and particulars of rapid and economical work accomplished, apply to

J. G. CRANSTON,

22, GREY STREET NEWCASTLE-ON-TYNE.

FIRST AWARD.
SYDNEY. 1879.

BICKFORD'S PATENT FUSES

FIRST AWARD.
MELBOURNE, 1881.

SILVER MEDAL OF THE MINING INSTITUTE OF CORNWALL, TRURO, 1880,
for an Improved Method of Simultaneous Blasting.

FOR SIMULTANEOUS BLASTING.

BICKFORD, SMITH AND CO.,

THE INVENTORS, AND ORIGINAL PATENTEES AND MANUFACTURERS OF

SAFETY AND INSTANTANEOUS FUSES AND IGNITERS

FOR USE IN ALL BLASTING OPERATIONS AND SPECIALLY PREPARED FOR ANY CLIMATE

Note the TRADE MARK: Two Separate threads through centre of Fuse.

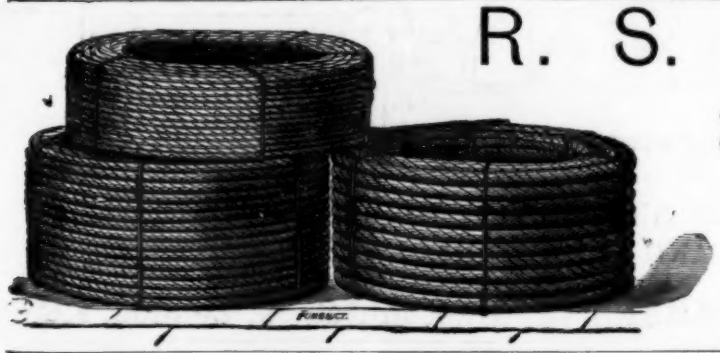
BICKFORD, SMITH AND CO.'S Patent Igniters and Instantaneous Fuses for simultaneous blasting are being extensively used at home and abroad. This improved method is the cheapest, simplest, and most dependable ever introduced for simultaneously firing any number of charges. For full particulars, see Descriptive Catalogue.

PRICE LISTS, DESCRIPTIVE CATALOGUES, AND SAMPLES TO BE HAD ON APPLICATION.

FACTORIES—TUCKINGMILL CORNWALL; AND ST. HELENS JUNCTION, LANCASHIRE.

HEAD OFFICE—TUCKINGMILL, CORNWALL.
LANCASHIRE OFFICE—ADELPHI BANK CHAMBERS, SOUTH JOHN STREET, LIVERPOOL.
LONDON OFFICE—85, GRACECHURCH STREET, E.C.

Every package bears Bickford, Smith, and Co.'s copyright label.



R. S. NEWALL AND CO.,

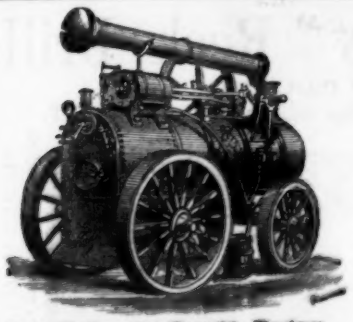
Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.
IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.
COPPER CABLES of high Conductivity for Electric Light and Power.

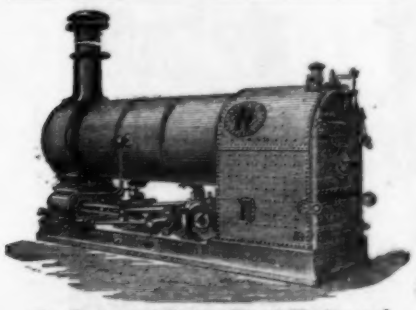
London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.
Glasgow: 68, ANDERSTON QUAY.
MANUFACTORY: GATESHEAD-ON-TYNE.

NOTICE TO COLLIERY PROPRIETORS, MINE OWNERS, &c.



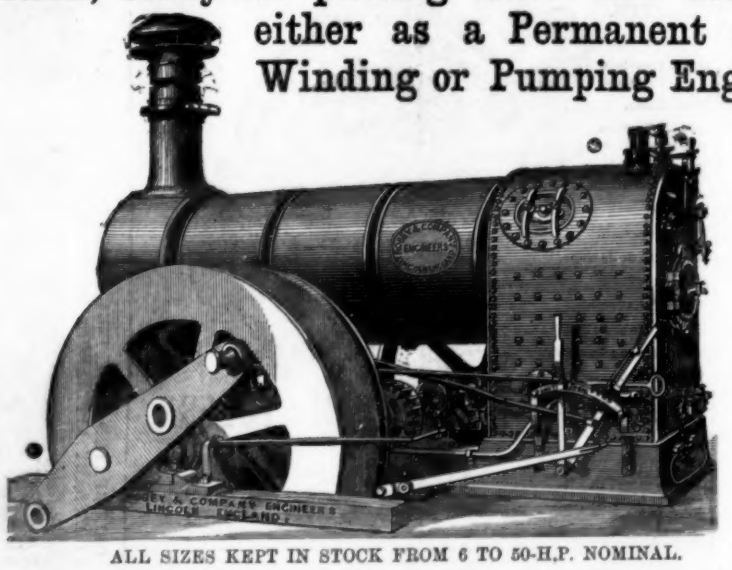
Robey's Superior Portable Engines, 4 to 50-h.p.

LONDON OFFICES:—
117, Cannon Street, E.C.



The Improved Robey Fixed Engine and Locomotive Boiler Combined, 4 to 65-h.p.

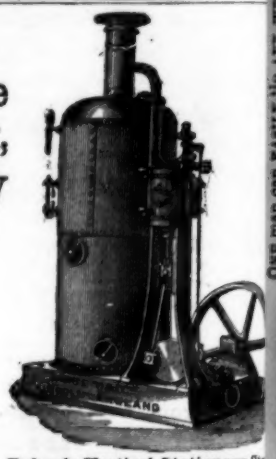
The PATENT "ROBEY" MINING ENGINE is complete in itself, ready for putting down and setting to work, either as a Permanent or Temporary Winding or Pumping Engine.



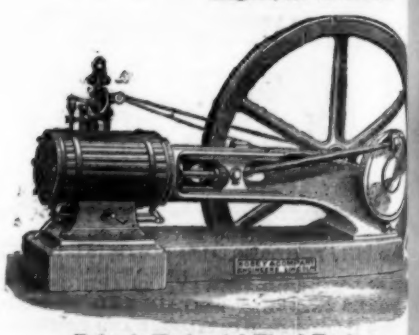
ALL SIZES KEPT IN STOCK FROM 6 TO 50-H.P. NOMINAL.

Please note this is the Original "ROBEY" Engine as designed and manufactured by Messrs. ROBEY and Co., of Lincoln. All others are mere attempts at imitation.

For particulars and prices apply to the Patentees and Sole Manufacturers—

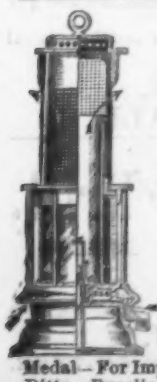


Robey's Vertical Stationary Steam Engine, 1½ to 16-h.p.



Robey's Horizontal Fixed Engines, 4 to 60-h.p.

ROBEY & CO., ENGINEERS, LINCOLN.



ESTABLISHED 1820.

JOSH. COOKE AND CO.,

SAFETY LAMP AND **GAUZE MANUFACTORY,**

Honourable Mention, Paris Exhibition, 1878
Illustrated Price Lists free, by post or otherwise.
MIDLAND DAVY LAMP WORKS,
Belmont Passage, 203, Lawley-street,
BIRMINGHAM.
Makers of Williamson's Double Safety Lamp,
Williamson's Patent Double Safety Lamp shown half in section.

Medal—For Improved Invention—London, Kensington, 1874.
Ditto—Excellence of Workmanship—Wrexham, 1867.

BRITISH AND FOREIGN SAFETY FUSE COMPANY,

WORKS: REDRUTH, CORNWALL,
MANUFACTURERS OF

PATENT SAFETY FUSE FOR ALL KINDS OF BLASTING PURPOSES,
For MINING & RAILWAY OPERATIONS,
ALSO FOR
ALL KINDS OF SUBMARINE WORK.

This FUSE is made for ALL CLIMATES, and of any length and sufficient water-resisting properties to ensure ignition at any depth.
For PRICE LISTS, SAMPLES, &c., apply at the Works, or
LONDON OFFICES—3 and 4, Adelaide Place, King William Street, London Bridge, E.C.
TRADE MARK,—TRICOLOUR COTTON (Red, White, and Blue), running through the column of Powder.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

Registered Telegraphic Address:—"GILDERSOME, LEEDS." A. B. C. Code used.

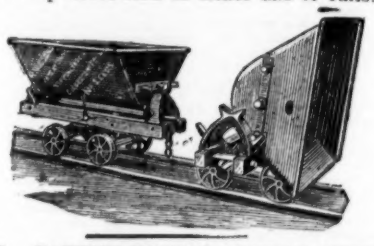
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

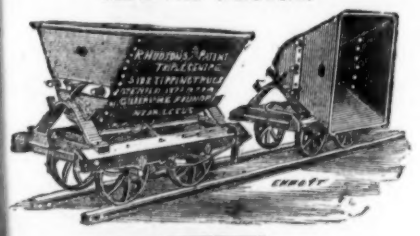
CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

1.—PATENT STEEL END TIP WAGONS.

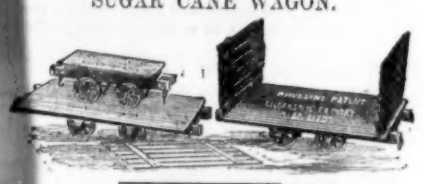
2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



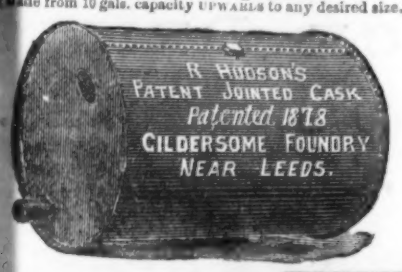
3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



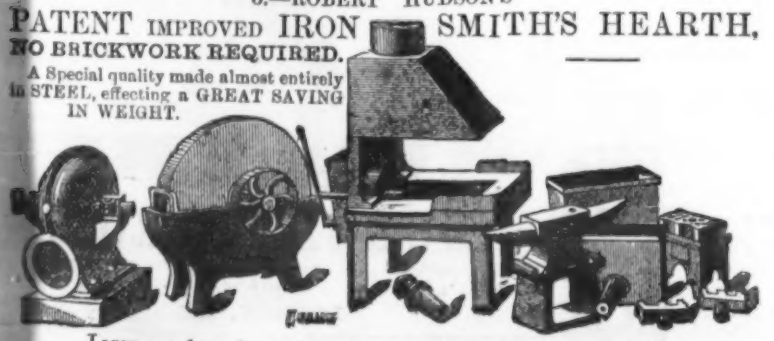
4. PATENT STEEL PLATFORM OR SUGAR CANE WAGON.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)



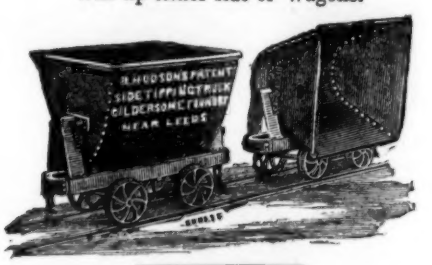
6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH,
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



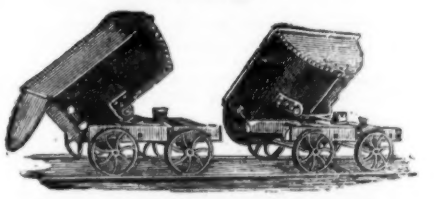
Large numbers in use by all the principal Engineers in this country and abroad.

7.—PATENT STEEL MINING WAGONS.

8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.

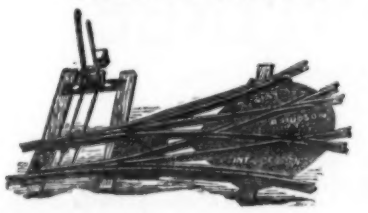


9.—PATENT STEEL ALL-ROUND TIP WAGON.



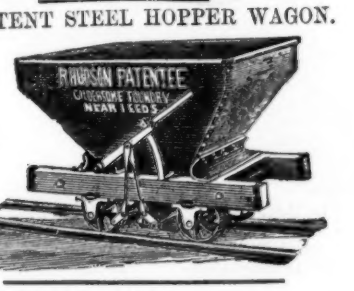
10.—LEFT-HAND STEEL POINT AND CROSSING.

11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



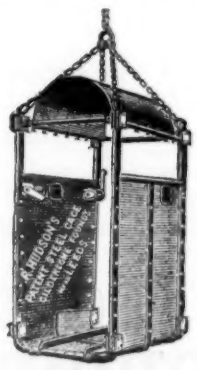
12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

13.—PATENT STEEL HOPPER WAGON.



14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

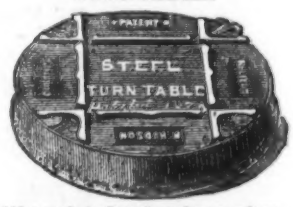
15.—STEEL CAGE.



16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.



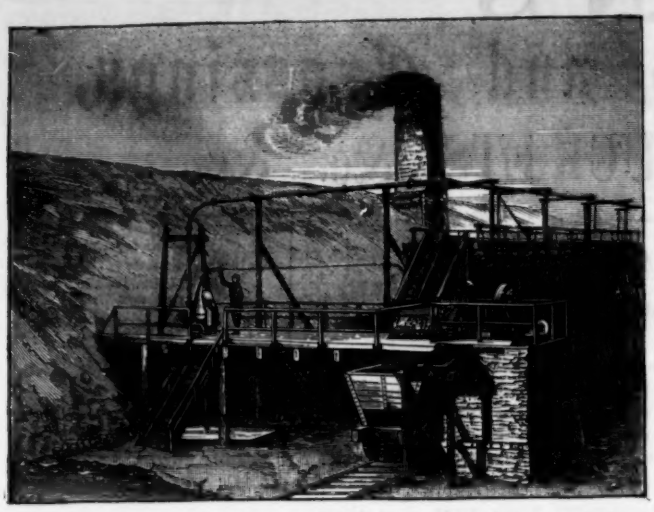
(Also made in CAST Iron for use where weight is not a consideration.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrow

18.—"AERIAL" STEEL WINDING TUB.

Largely employed in the South African Diamond Fields.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES



The above Illustration shows a Pulsometer as applied at a Colliery. See following Extract from Testimonial:—

"We have no trouble with the Pump through choking, although during one week we clear about 100 tons of small dust out of ponds for the purpose of settling water. Even with this it still pumps a great quantity of almost slurry coal back to top end of box. I might say it has far exceeded our utmost expectations all the time we have had it applied to coal washing."

PULSOMETER ENGINEERING COMPANY, Limited,

NINE ELMS IRONWORKS, LONDON, S.W.,

And 61 and 63, QUEEN VICTORIA STREET, E.C.

TRADE The Pulsometer MARK.

PATENT STEAM PUMP

Is admirably adapted for all difficult and awkward situations, especially where the Pump has to be suspended on a chain as in sinking operations. The absence of exhaust steam is a great convenience in confined situations. Having no moving parts except the simple and easily replaceable valves it is invaluable for coal washing and ore washing purposes, as it does not cut out with grit and sand as other Pumps do.

SEE CHANGE OF ADVERTISEMENT EVERY FORTNIGHT.
And please mention paper when enquiring.

MINING PUMPS FOR ALL DUTIES.

Horizontal Plunger Pumps for Gritty Waters and Heavy Pressures.

Vertical Plunger Pumps for Sinking Work.

Boiler Feeding Pumps.

BAXTER'S PATENT KNAPPING STONE BREAKER.

THE LAST FOUR MEDALS AWARDED FOR STONE BREAKERS,

1881.

1881.

FACTS SPEAK FOR THEMSELVES.

Our Machine, tested by the Judges Calcutta, broke 7 tons in 45 minutes o 2¼ in. ring, and was awarded First Class Certificate and Gold Medal in competition with the Blake Machine.

The ONLY MACHINE which has never failed to do what it was guaranteed, and is also the ONLY MACHINE which has never had a driving shaft broken or the end sent out.

See our Machines now being exhibited at the Crystal Palace, London.

We shall be glad to receive any kind of stone ore or other material to be broken or crushed at Shrewsbury Royal Show, Stand No. 247, in July, either by our Breaker or New Patent Fine Crusher.

We also exhibit at the Highland Show at Edinburgh in July.

PATENTEES AND SOLE MAKERS—

W. H. BAXTER & CO., ALBION STREET, LEEDS.

SYBRY, SEARLS, & CO.,

MANUFACTURERS OF THE

CELEBRATED MINING STEEL, BRANDED SSS

CRUCIBLE STEEL CASTINGS

Of Special Toughness, Strength, and Durability.

SPECIAL ROCK DRILL STEEL,

Tool Steel, Shear, Blister, Spring, Files, Hammers, Picks, &c.

CANNON STEEL WORKS, SHEFFIELD.

MANCHESTER WIRE WORKS.

NEAR VICTORIA STATION, MANCHESTER.
(ESTABLISHED 1790).

JOHN STANIAR AND CO.,

Manufacturers by STEAM POWER of all kinds of Wire Web, EXTRA TREBLE STRONG for

LEAD AND COPPER MINES.

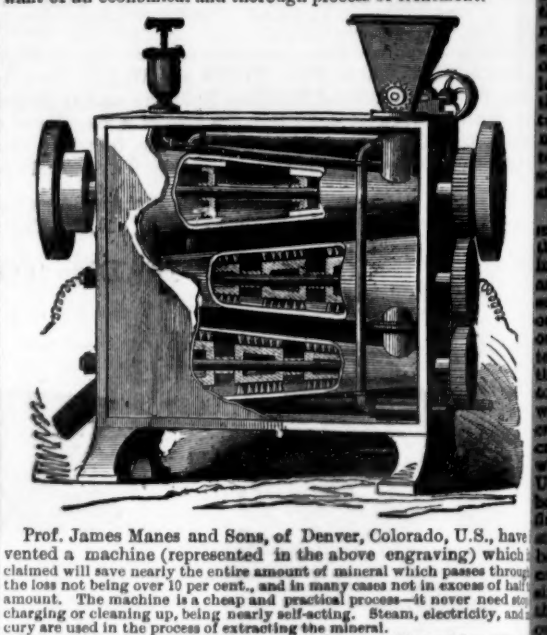
Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper.
EXTRA STRONG PERFORATED ZINC AND COPPER RIDDLES AND SIEVES.

PERFORATED IRON, STEEL, COPPER, AND ZINC PLATES IN VARIOUS DIMENSIONS AND THICKNESSES,
Shipping Orders Executed with the Greatest Dispatch.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings stamp mills, or the sands of hydraulic gold diggings, or from black sands on the coast of Oregon or California, and other parts the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in tailings of stamp mills or flumes. This alone, if it could be saved would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have vented a machine (represented in the above engraving) which claimed will save nearly the entire amount of mineral which passes through the loss not being over 10 per cent., and in many cases not in excess of half amount. The machine is a cheap and practical process—it never need stop charging or cleaning up, being nearly self-acting. Steam, electricity, and cury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver or refractory after roasting. It consists of a series of three or more large inders, wider at one end than the other, placed one above the other in a zontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the sec and then to the third. The first cylinder is furnished with steel mullers nearly touch the sides of the cylinder, and revolve at a good rate of speed, ing the mercury and ore. The second cylinder is furnished with large brushes attached to the shaft or spindle, revolving at a high rate of sp through this a current of electricity is furnished by a Westinghouse dyn electro machine, which materially assists in gathering the particles of very gold together, and thoroughly amalgamating the metal and mercury. The cylinder is similarly furnished to the second; into this the amalgam passes is again acted upon and mixed by the brushes to catch any gold which have escaped amalgamation in the second. A fourth cylinder may be u found necessary.

The amalgamated pulp then passes through a revolving copper drum, p with quicksilver inside. As the drum revolves it takes up the most part amalgamated gold. As the inside of the drum is constantly washed with a of water from perforated pipes fixed inside of said drum, a clean-plated s is constantly brought in contact with the pulp or tailings as it passes out the cylinders. After leaving the drum it falls down on to incline copper p the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stoppi machine, and any live quicksilver that passes will be caught in syphons. tailings are carried off with the water. The machine when attached to thei will be driven by the waste water; it sifts the fine sands from the coarse g and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent 1.—The saving of almost all the mineral passing through the machine.
2.—The loss being less than 10 per cent.
3.—The entire absence of loss of the amalgamated material, thereby savi the mercury, which, with the processes now in use, there is a large loss b mercury and the precious metal.
4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off volving brushes, the most minute particles of gold will be caught and re which in the ordinary flume and stamps passes off with the water; thi amounts to a large percentage.

The inventors state that if English stock companies will give their assi to work the black sands of Oregon and California by paying for the buildi the machines, they will take a share of the gold for their services, or the send their machines to any part of the world, or will sell patent rights to desiring any of their patent machines or revolving furnaces for roasti smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sp Ball Pulveriser, that crushes and pulverises at the same time, does as much work as eight stamps in a day, crushing either or dry.

PRINCIPAL OFFICE OF

Prof. MANES and SONS,

No. 372, Glanarm Street, Denver, Colora
U.S.A.

All our machines and furnaces are made by the Colorado Company of Denver, Colorado, the most extensive mining ma works in America.

ROCK DRILLS

FOR

HAND AND POWER

DUNCAN BROS.,

32, QUEEN VICTORIA STREET,
LONDON, E.C.

MR. P S. HAMILTON (late Chief Commissioner of Mine the Province of Nova Scotia), PRACTICAL GEOLOGIST, M AGENT, and MINING ENGINEER, HALIFAX, NOVA SCOTIA.
PURCHASES and SALES of MINING PROPERTY effected, with cau gard to the interests of clients.

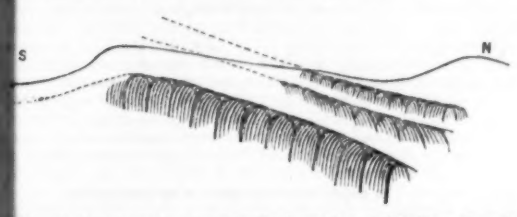
Original Correspondence.

THE GOLDEN QUARTZ REEFS OF AUSTRALIA—No. II.

SIR,—The top saddle first discovered had nearly equal legs, and the middle was upright. The second Hustler's reef had a cant to the west, and the eastern leg was the most important one. The third reef had a similar underlie, but the western leg was the principal one.

Corrugation of Strata.—I must also mention before I proceed further that corrugated strata are not as a rule corrugated symmetrically; on the contrary, anticlinals are usually bent over, or have a dip to the one side or the other, and synclinals are similarly affected as the saddle reefs partake of the lists—to use a nautical phrase—of the strata in which they are enclosed. Consequently the one leg of such reef may be nearly vertical, whilst the other may be 50° or 70° from the horizontal. The one leg may be the largest at one end of a line of reef, and the opposite leg the biggest at the other end, the circumstances of occurrence having altered. I have just been remarking on the want of symmetry in the anticlinals and synclinals of the lower silurian from the views we get of them in cross sections, but this want of symmetry is also perceptible if we look at them longitudinally. For instance on the third Hustler's reef there is what miners term a crown formation—that is, the anticlinal below the top of the Hustler's Hill to the north dips north and to the south dips south, and the saddle reef partakes of this change of dip with the strata.

Dips of Shoots of Quartz.—To prevent any misunderstanding of my meaning, where I use the terms dip and underlie, I may state that I always use underlie in the same way miners do, meaning the inclination of a reef or lode at right angles to the strike or bearing, and in this sense I never use the term dip. In writing on mining subjects when I use dip I always mean the inclination of a saddle reef, of a shoot of quartz, &c., in the line of strike or bearing of a reef or lode. Mining managers are not sufficiently particular about the terms they use, and this want of care is very confusing sometimes to those who read their reports with a desire to understand them, and to learn from them the changes that take place in the lodes and reefs worked in the mines under their supervision. But to return to the crown formation of the Hustler's reef. The mines situated on the crown and to the north of it on the northerly dip have been very rich, whilst those to the south on the southerly dip have been very poor. Under the top of the Hustler's Hill the cap of the saddle ran nearly horizontal, and the reef pinched or got small, but it began to dip at first slowly going north and then faster, the saddle and its legs steadily increasing in size and richness for about 250 yards. As will be seen by the following sketch section (longitudinally) the continuation to the south of the top saddle reef has been removed ages since by denudation, and so also No. 2 reef beneath it. Whether they too had crown formations as well as No. 3 reef is now beyond our knowledge, but it is quite likely they would conform to a great extent with those beneath them, judging by general experience in such matters, in this and other gold mining districts:—



Although the above is a longitudinal section of this line of reef for a short distance, I have endeavoured to show on it the transverse sections of the reefs one below the other, also by showing the saddles and their east and west legs roughly, in accordance with their occurrence in the rocks. The bars arching to the south represent the reefs sloped on the western legs, and the cross bars arching towards the north represent the extent of stoping done on the eastern legs of the three-saddle formed reefs. I do not pretend that this representation on so small a scale is accurate or complete, but it is a rough approximation to the work done, and will suffice for the purposes of this paper, and I hope this sketch will aid to give the reader a more clear idea than my previous description affords of the mode of occurrence of these peculiarly-formed auriferous quartz reefs. The single waved horizontal line represents the profile of the surface as it rises up the hills and falls down to the gullies.

Lava streaks as they are locally known to the miners, or at least were in the early days and up to recent years, are also now called lava dykes. They are really basaltic dykes of comparatively recent origin, as may be judged when I mention that they are not faulted in the slightest degree. Only in one claim is there, so far as I know, even an apparent indication of a fault of one of these dykes on Bendigo. They cut through legs of quartz reefs, through slates and sandstones, through the saddles of quartz reefs, and even through bodies of quartz ranging from 40 ft. up to 70 and 80 ft. in thickness. Lava dykes cut through everything underground, and nothing cuts through them but miners. To the latter they are sometimes of service, because decomposition has rendered them much softer than the altered sandstones and slates, and they are availed of to make rapid communication between levels. In many mines the dykes are composed of dense hard basalt, whilst in others decomposition has only partly done its work, leaving large and small rounded nodules of the hard rock, surrounded with the usual concentric envelopes of more or less decomposed basalt. These dykes appear to belong to the same period as do the older volcanic rocks of Victoria, which Mr. Alfred R. C. Selwyn, late director of the Geological Survey of Victoria, believed to indicate the close of the miocene epoch, whilst the newer volcanic rock marks the end or nearly so of the pliocene epoch, and its eruptions seem to have been continued in to the most recent post pliocene time.

Seeing that these dykes cut through rocks and reefs, but remain intact and undisturbed, we have in them presented to us good evidence of the tranquil period that has elapsed, since the strata and quartz reefs were riven and split open, in order to give vent to the excess of plutonic energy that was imprisoned far down below. As a rule the basalt of these dykes is much softer through decomposition at the present time than the slates and sandstones or reefs which they intersect, and consequently would offer less resistance than them to motion in their vicinity in at any rate recent times. Since the close of the miocene epoch then has this upper crust of the earth wherein lava streaks occur in Bendigo relapsed into a lengthy period of restful peace and quiet. Prior, however, to the disturbed period in which these dykes made their appearance the strata and the quartz reefs have suffered rupture after rupture, and also considerable displacement or faulting. It was, I consider, undoubtedly due to the fractures in the anticlinals and subsequent displacements of the strata and reefs that the lava dykes are found associated with what I will call our main lines of reefs. In these lines of reefs the pent-up lava found the weakest local points of the crust of the earth, and through them forced its way to the surface. It is consequently reasonable to infer that lava dykes will be found to accompany what are locally termed permanent lines of reefs, or reefs that will be found to continue to great depths, and the operations on which are likely to prove of a permanent character. Lava dykes follow lines of faults or slides as they are often called, also slip along the hanging and foot-walls of reef, and jump across strata from saddle reef to reef on independent undulating, not slide-like straight lines. So much was this the case in a vertical oval shaft sunk on the old Victoria reef that a section of the course of the lava streak down it strongly resembled a vertical section of the twist of a cork-screw for about 130 ft. in depth from the surface. Doubtless the shape of the shaft assisted in giving it this appearance, although its real course was undoubtedly almost zigzag. In 1863 I pointed out to Victoria miners that these lava streaks might be looked on as guides to reefs, and should as such receive more of their attention than they at that time obtained They really are worthy of the title of guides, for experience has since proved they rarely run far away on a slide line from one saddle reef before they dart over to another reef in their upward course to the surface. Lava dykes have had very little or no effect on either the reefs or strata they pass through, and it would be erroneous to credit them with causing reefs to be richer or poorer, or having any influence on them whatever, beyond their intersections. In these general remarks on lava dykes, I have sufficiently mentioned all points that are of interest, without going into detailed descriptions of the Hustler's reef dyke.

Minerals.—In the Hustler's reef the undermentioned minerals occur in the laminations of the quartz, which laminæ for the most part consist of black carbonaceous clay-slate, in which are embedded arsenical and iron pyrites, galena, and zinc blende. Gold occurs in association with galena, zinc blende, and pyrites. These minerals and gold also occur in the solid quartz in lesser quantities than in the laminæ. The pyrites yield when treated in reverberatory furnaces, &c., from 2 grs. and upwards of gold to the ton. In certain parts of the reef large bodies of arsenical pyrites have been found, which proved to contain by assay 10 ozs. 17 dwts. of silver per ton, and only 11 dwts. 6 grs. of gold.

Gold.—In this reef the gold as a rule is found to be fine and evenly distributed though the laminations of the quartz and also in the solid quartz. Messrs. Latham and Watson had spent on their mine up to 1871 over 130,000*l.*, but they declined to make public the total amount of gold they obtained. The profits made were supposed to have been very large. For some years this mine has been in the hands of a public company. The adjoining mine to the south is that owned by the Great Extended Hustler's Company, which with its tributes has been exceedingly rich. It has paid in dividends 557,900*l.* on a called up capital of 28,000*l.* The reef was worked in this mine from 40 to 60 ft. in width; the whole of that width was put through the battery, and yielded from 1 to 4 ozs. of gold to the ton. This saddle presented quite a dazzling appearance; gold was to be seen everywhere, and in places the quartz was thickly studded with it, whilst in others the gold ran in seams through the stone, and for a couple of years this mine was a real working jeweller's shop, its walls and roof and floor glittering with native gold. But I have no intention to attempt to depict the richness of the reefs in Australia after this manner; sometimes the impressions left on one by such sights may force me to say a few words about like deposits. I, however, desire to restrict my remarks to the modes of occurrence of gold and of quartz reefs, and phenomena appertaining thereto. In concluding my notes on the Hustler's reef I may mention that H.R.H. Prince Alfred was banquetted in an unusual manner by Messrs. Latham and Watson in the 400 ft. level of their mine. I leave much untold about this reef that would be interesting, and I must leave still more about other reefs, if I expect to conclude my notes within reasonable limits.

Melbourne, May 27. WM. NICHOLAS, F.G.S.,
Consulting Mining Engineer.

THE GOLDEN QUARTZ REEFS OF AUSTRALIA.

SIR,—Please give me space, as an old resident in the Mount Alexander district, to correct two errors (evidently typographical) in Mr. Nicholas' letter in last week's *Mining Journal*. In writing he must have put it Mt. (Mount) Alexander, and this has been read Mr. Alexander by the compositor. I refer to the two mentions of it in the sixth paragraph beginning "Bendigo gold field." You will see that this is borne out by the paragraph in the second column beginning "Geology." This explanation will render plain that which is now obscure. The Castlemaine gold field was first called Mount Alexander from its proximity to a mount of that name that is visible for many miles round.—*Seaford, Lewes, July 21.* HENRY MOON, M.E.

THE LITERATURE OF MINING—No. II.

SIR,—The literature of mining appears to be more descriptive than scientific, although science is largely resorted to in its prosecution—more doggedly prosaic than poetical, although imagination is largely represented in its archives, having largely influenced its proceedings. But of all that has been written the journals of mining—your own most prominently—represent its literature, and what do they teach? Is it not that it is not only not yet reduced to a science, but that it never can be; that at best it can be but an ever-teaching and a never-taught avocation or pursuit. If this conclusion be the true one experimental training can be for no better purpose than learning to learn again. Its several districts and sectional divisions resemble different residential or business establishments, similar externally in material and general outline, but dissimilar entirely in their sectional divisions, arrangements, and internal methods and peculiarities—where passing from one to another—the different order of each necessitates a new acquisition and departure, not of mechanical practical efficiency, but of the peculiarities severally attaching. If an approximately qualified practical experience is so slowly and uncertainly acquired—uncertain, first, from the want of opportunities; and, secondly, from thoughtless inattention, and from which practical experience all theories that are in reality such are founded, and as abstract science can furnish no sufficient data for the construction of a theory in natural science pertaining to undisclosed phenomena it is to practical experimentation that scholastic institutions are indebted for the data of their theories and speculations, which they teach and endeavour to establish as the deductions of abstract science, and formulate the lights and guides of amateurs—graduates—emerging from such institutions as full-fledged mining experts and accomplished professors.

If metalliferous belts and zones differ from each other having certain features peculiar to themselves, distinguishing characteristics from occular evidence derived from practical issues, the knowledge of which is vital to so many enterprises what value can attach to any theory—so called—that is not founded on inductions from analagous conditions as reference to practically demonstrated and irrefragable standards. Since no one can literally see into the ground it is only by inference that its superficies can be interpenetrated, and that can only be done from a personal knowledge of the phenomena or knowledge derived from the tradition and literature of practical mining. The science of mining is certainly comprised in a knowledge of its collaterals and the proper methods of their application and subservancy, including the necessary skill and dexterity. The internal structure of metalliferous zones or of individual mines therein cannot be determined from their external configuration, except in limited and very general outline. It is, therefore, imperative in order to become acquainted therewith to practically explore the hidden recesses, and thus by earnest observant attention to such peculiarities as characterise identical or dissimilar formations mentally receive through the medium of the senses the impress of their features for future reference analogical, synthetical, and analystic. All that we know of natural laws pertaining to the mineral kingdom is derived from a strict observance of their phenomena. Therefore, theory relatively must be founded on such observations of facts and proofs, otherwise it is not theory, having no basis. Abstract science does not apply to it; it is physical—the relation of cause and effect, and deducible therefrom by proper process analogically directed. What but experimental knowledge can form the groundwork of theory where abstract science does not apply, and where the evidences of cause and effect are patent to the senses. The relation of one thing to another or other things is indisputable—that of rocks and cross-courses, of faults and slides to metalliferous lodes, their structure and composition, their position relatively to the planes, dip, and strike of the rocks, and to the angles of intersection of the non-metalliferous veins as above—are phenomena of vital import to the productiveness and continuation of metalliferous fecundity.

Primitive mining must have been without a guide beyond the evidences of sense; having had no previous experience it was without reference—nothing of the past to revert to. Physical laws governing the mineral kingdom were probably unknown at those early periods and unthought of, whilst abstract science if then existing must have been unrecognised in the sphere of mining, as it had then as now no vocation. The experience of succeeding generations during the evolution of centuries has not altered the basal facts fundamental to the issues of practical mining whether as to its success in its numerous degress or otherwise; but it has largely disclosed its phenomena, and afforded the means whereby a comparative knowledge of results may be obtained *a priori*, which if properly understood, earnestly espoused, and honestly adhered to would be an approximately unerring guide to conclusions, not that the precise measure or continuance of metalliferous wealth in its various channels and recesses can be foretold, but the probability of its existence, its whereabout, and the surest, shortest, and cheapest methods by which it may be discovered, it is its province to determine with the nearest approach to accuracy. The descriptive literature of mining shows that appearances differ, and in proportion to such differences opinions are or should be qualified. The thoroughly experienced practical miner is never positively dogmatic whatever his impressions may be, and never excludes the speculative part of mining from his calculations; its possibilities and its probabilities are with him always in unison. ROBT. KNAPP.

Ione, Nye County, Nevada, June 23.

CHONTALES MINING COMPANY.

SIR,—I unfortunately in the year 1868 became a shareholder in the above company, and since that date have witnessed two or more reconstructions, with continued promises of future success never realised. After waiting 16 years I am compelled to ask myself this plain practical question—What have the shareholders attained, and what do they possess for their very great outlay; and the reply is nothing but undeveloped mines, an exhausted exchequer, and a manager who now scarcely makes a profit with 22 dwts. of gold to the ton, whereas former managers did more work, and made profits with 4 dwts. to the ton. Mr. Palmer's letter, in last week's Journal, proves I think most clearly that although our directors are paid for managing and controlling our affairs they do not do so, otherwise the manager could not sell or dispose of anything without their consent, nor would he dare make such a cost-sheet without at once giving a very plain and unequivocal explanation.

I think the present directors, having had more than a fair trial, are found sadly wanting, and that the time has now arrived for the shareholders to exercise their power, and make a complete clearance. With a few practical and honest men at the helm we should not have to wait patiently for another 16 years before we had some return for our money.—*St. Leonards-on-Sea, July 21.* J. HUGHES.

CANADIAN MINING RAILWAY AND GENERAL INTELLIGENCE.

SIR,—The Grand Trunk Railway.—There appears to be an essential difference between the principles of management on the Grand Trunk Railway and other railways on this continent. The motto of other railways is—first, perfect safety and accommodation, including speed and civility; second, economy. The motto of the Grand Trunk Railway appears to be—first, economy; and, second perfect safety and accommodation, including speed and civility. The Canadian Pacific Railway, for instance, prefers to pay the men and have fewer officers at less cost for the whole; the Grand Trunk Railway deducts the wages of the men, but does not decrease the number of the officers or their pay. A perfect system of book-keeping at Montreal could be carried on with much less assistance by a few well-paid men who did their work, instead of the army of clerks that get miserable salaries for adding up figures. Then the line appears to be worked on the "keep in at the spigot and let out at the bung hole" principle. At Gwelph, for instance, they have a station of a line of railway that formerly belonged to the Great Western, about a mile from the Grand Trunk station, then they have a branch to Godieschill (in the town and convenient to passengers) that they do not use at all, and of these three neither of them is deserving of the name of a railway station, but might be called a stopping place. Here they might build a union station which would accommodate both lines of railway, and sell the land and buildings of the other two stations. The value of the two stations and land would go far toward paying for a new station.

The morning of July 1 was opened by a smash up on the Grand Trunk Railway, a little east of the station on the main line. It seems that a special freight going west was trying to make time and get into Gwelph before the "mixed" going East left that station. But it did not do it, "you know;" and this trying to run two trains proceeding in opposite directions on the same track is about played out. There is no good in it. The Grand Trunk should not try to do it again. There was a high embankment where the trains came together, and had it not been that the "mixed" going East was able to decrease the speed there would have been a terrible accident. As it was, both locomotives are very much injured. The passengers were pretty thoroughly knocked about and a lady injured.

How long the Government will submit to allow single tracks on main lines of railway in this country it is hard to say. Of course, when the country was new and the traffic small a single line could do all the business, but now through the well settled portion on the main line from Montreal to Detroit a double track is imperatively necessary. If the money spent in buying extensions and running little "one-horse branches" had been expended by the Grand Trunk Railway in improving the main line and building a double track and affording decent stations there would have been more profit. The Ontario and Quebec division of the Canadian Pacific Railway have not yet been able to finish their line on account of some swamp in the township of Kalendar. They have built a line across it several times, but it has given way and gone down. They expect, however, to have it finished by August.

The Semi-Centennial at Toronto is now exciting the attention of the country. In 1834 the town of "Little York" became a city and changed its name to that of "Toronto." It has now a population of about 100,000, and is likely to increase, as population is like money, and when a city commences to grow it is like a snowball, increasing as it becomes larger very quickly. In 1834 the population of this town was 9254, full of mud, and going throughout the province by the euphonious name of "Dirty Little York;" then it was changed to Toronto, and by the increase of population, the energy of its inhabitants, and the immigration from other countries it has become quite a place. One would suppose from the speeches and the press and the excitement, that the inhabitants have an idea it is the only city in the world. One orator stated in public that the increase in population was greater in the last 50 years than any city on the continent except Brooklyn. I wonder whether he ever heard of Chicago with its 500,000 people? I wonder if he knew what Chicago was in 1845? But all this blow and hubbub and celebration will be of benefit to the city, as it has drawn about 50,000 people a day from the country, and they could not have spent less than $2 each, or $100,000 a day for a week. In Montreal last week they had their St. Jean Baptiste Celebration for nearly a week, and the city was crowded with people. It seems to be a good idea to combine business and pleasure, and by organising a fete drawing crowds into the large cities. Canada is doing pretty well with regard to celebrations this year. The year opened with the Ice Carnival, in Montreal, in February. On May 24 there were local celebrations. From June 30 to July 5 the grand semi-centennial celebration in Toronto; then in September the Industrial Exhibition will be held open for two weeks in Toronto; and in August the British Science Association at Montreal.

The Temperance Wave.—The temperance wave is like the cold wave that passes over Canada two or three times every winter. The temperance wave is now passing over Canada. An Act was passed by the Parliament of the Dominion giving permission for the inhabitants of each county to pass a law prohibiting the sale of liquor or as it is commonly known on this continent, introducing the "Maine Liquor Law." The Act is called the Scott Act, and all the rabid temperance men and excited women are now engaged in the crusade. If they had sense enough to abolish the sale of whisky, gin, and brandy (except for medicinal purposes) and allow beer, and light wines to be sold and used they would be able to do a great benefit. Whisky is rightly called the "curse of Canada." It is so cheap (only 5 cents or 2½d. a glass) and so strong and has such a deleterious effect on the brain in this climate that the Government should put a stop to the sale or use of it as a beverage just as they prohibit the importation of diseased cattle, or the indiscriminate sale of poisons. Our police-courts are full of the victims of whisky, our gaols are full, our lunatic asylums are crowded. It is time the Government of the Dominion should stamp it out But those rabid

temperance men and blathering foolish women will do more harm than good. They will make the whole thing an absurdity, and the manufacturers of alcohol will still continue to turn out whisky. If the Government are afraid of the power of the licensed victuallers there is a very simple way in which this deadly whisky drinking could be stopped, and that is to fine every tavern keeper $500 for selling whisky, brandy, or gin at less than 25 cents a glass. Very few would drink at that cost, and the consequence would be beer and lager beer and light wines would take the place of the "curse of Canada."

The Federal Bank.—There has been a great decline in the Federal Bank stock, but there is little doubt there was no cause for alarm. The bank is strong and can sustain the shock, but the cause of the decline was attributed to speculation and the holders being unable to pay the margins. Mr. Stabling resigned and Mr. Yarker, of the Bank of Montreal, has been appointed in his place.

North-West Land Company.—The account of the meeting of this company in London was received by telegraph. It does not appear that there was anything done except that a storm arose. In Canada we cannot understand why this stock has gone down so much. The capital is all paid up, the land is paid for, and there does not appear to be any reason why the stock should not be above par. The land was bought for about $3 and half the town sites, it is certainly worth as farm land $6. The company is bound to pay well if it is even half managed. Look at the Canada Company. What dividends were paid out to their stockholders? It is to be hoped this company will not be so extravagant as the Canadian Company in the way of salaries, &c. I suppose it was the interest of some person to keep the stock low, and it was accordingly so done.

The Central Ontario Iron Mines.—If capitalists are looking for investments in England they have certainly lost a golden opportunity in not getting in on the "ground floor" in the above mines. These Canadian Mines have been known for years, yet they remained almost entirely undeveloped till this company was formed. The mines are in the county of Hastings, north of Beleville and Trenton, and consist of immense deposits of magnetic iron ore. Wharves have been built on Welber's Bay, on Lake Ontario, a most eligible situation, and a railway has been finished through Trenton as far north as the township of Wollaston. A visit to the mines was lately made by the following gentlemen:—W. Chisholm, of Cleveland, Ohio, President of the Coe Hill Mining Company; Senator Payne, of Cleveland; Mr. James McLaren, of Ottawa, President of Ottawa Bank; J. S. Ritchie, Aknon, Ohio, President of Ontario Central Railway; Mr. Samuel Mitchell, Marquetta, Lake Superior; F. A. Bates, mining expert; Mr. Preston, of Pittsburgh; G. W. McMullen, Mr. Coe, and Mr. Jas. B. McMullen. Weller's Bay on Lake Ontario, the shipping port of the railway, is about the best place that could have been chosen. Here the company owns a water front of over 150 acres bordering the entire deep water on the north-eastern shore of the bay, thus giving it access to one of the most desirable harbours on the lake covering, four square miles of deep water. The dock will be 2000 ft. in length by 28 ft. wide, covered with a massive superstructure, the crest of which will be 36 ft. above the water. This superstructure will consist of a deck with double tracks and openings between the rails, communicating with 150 ore pockets, from which the ore can be dropped directly into vessels.

Nearly 100 miles north, in the township of Wallaston, the road terminates at the Coe Hill Mine. On the hill overlooking the ore platform about 50,000 tons of rich magnetic iron ore lies neatly piled. The vein is about 40 ft. wide, and there is nearly (at this mine) 2,000,000 tons of good ore in sight. When one comes to consider that this ore can be laid down duty paid in Cleveland at $3·65 a ton, and the lowest rate of this kind of ore has been during the last 10 years $6 and the highest price $12, there appears to be an immense fortune in the mine. There are two other mines connected with this property.

The Lake Temiscaming Silver Mine.—This is at Lake Temiscaminque, north-west of Matama, on the Ottawa River, and the Canadian Pacific Railway. There are few mines in the country that deserve more notice, yet the transportation is so bad that it has been found difficult to enlist the aid of capitalists. On the whole, Canada appears to be waking up, and if we can get some more "Live Yankees" and some more "bloated haristocrat Henglismen" to "come over to Macedon" we may be able to induce the selfish narrow-minded folk that call themselves "capitalists" here, and do usury business, to turn their attention to productive industry.

Gwelph, Ontario, July 4. BOURONITE.

HEALTH ON THE GOLD COAST.

SIR,—In reply to one of the effusions from the pen of Mr. Chas. Stuart Dobson, in last week's *Mining Journal*, "Health on the Gold Coast," permit me to remark that that self-constituted medical authority, of evidently a very few months' experience of the Gold Coast, has failed to grasp the meaning and purport of my letter of March 29. If he will refer to the same once more he will, doubtless, find that my remarks applied to the Tacquah Gold Fields in the Gold Coast Colony, and not to such districts as Mr. Dobson, in his ignorance of West African geography, has been pleased to include within the Gold Coast colony. Mr. Dobson, in short, appears to think that the West Coast of Africa and Gold Coast are synonymous terms.

The recent death of a European at Abosso, of which Mr. Dobson has made mention, only adds one more to the already long list of mortality in connection with the French mining companies, which, as I have before stated, is notoriously higher than any of the other gold mining companies of that district. Furthermore, I fail to see how Mr. Dobson's rather rambling assertions in any way confute the conclusions that were to be drawn from the logic of accomplished facts, and I repudiate his gross imputation of my having pronounced the climate of West Africa a "salubrious" one, as well as his insinuations of self-interest. As a matter of fact, I had no interest whatever in the Gold Coast when I published my letter, and have very little now, insomuch that I am on the eve of leaving England for a distant colony.

I must confess I am at a loss to know how Mr. Dobson has acquired his information with regard to my social habits, not having had the slightest acquaintance with him, or even a knowledge of his existence either on the Gold Coast or anywhere else. His statement, therefore, of my daily use of quinine is so contrary to fact that I can only imagine the same to have been evolved out of that gentleman's inner consciousness. In short, if I may be allowed to proffer the advice, I would suggest that in future Mr. Dobson should allow the higher intelligence, whose opinion he advances, to speak for himself, when he himself has nothing more tangible to offer in the shape of experience or capacity in such matters. I can safely leave the matter for the future to the discrimination of your readers to decide as to whose opinion is the most reliable.

July 23. WM. BOURKE, M.B., Edin., M.R.C.S., Eng.

MINING IN QUEENSLAND.

SIR,—As increased interest is now being taken by British capitalists in Australian mining matters the subjoined extracts from local papers will no doubt be acceptable:—

It was a matter of common report yesterday (says the Northern Argus of April 30) that Mr. Fred. Morgan, one of the proprietors of the Mount Morgan Dee Mine, had sold three-eighths of his interest for a sum of 62,000*l.* The news caused some sensation "under the veranda," and if correct the Rockhampton district may congratulate itself upon the value of its gold mines, and the pluck and enterprise of those who have developed this particular claim.

We (Rockhampton Bulletin) have to record a further sale of an interest in the Mount Morgan claim at the Dee River Gold Mines. Last week we stated that Mr. F. Morgan's interest had been purchased by Mr. W. K. D'Arcy for 62,000*l.* The sale of the property is now confirmed by Messrs. Callan and Co., who are, however, very careful not to disclose the price, contenting themselves by stating it was satisfactory. The share of which Mr. D'Arcy became the proprietor was three-tenths of the prospecting claim and three-eighths of the purchased property, and the same interest in the machinery, &c. He has disposed of one-third of his share—or one-eighth of the freehold property and one-tenth of the prospecting claim—to Mr. J. Ferguson, M.L.A., for the sum of 26,000*l.* This is very satisfactory news, and will no doubt have the effect of giving a fresh impetus to mining matters around Rockhampton. N. BARTLEY.

Brisbane, May 5.

THE PRESENT PRICES OF METALS, AND METALLIC MINES—No. III.

SIR,—You will first allow me to thank you for the insertion of my two former letters on this subject dealing with our home tin and copper mines, and I now send, as promised, my views as to how our home lead mines may be made to contend successfully against foreign competition. In order to do so, in the first place, and foremost of all, is the necessity for rock-drills of the same class we have to contend against and in use in these mines out of this country. It is mere folly to go on producing the same quantity of ore produced by hand-labour; engine-shafts can be sunk and levels driven by machinery four times as fast as by manual labour; and it stands to reason that increased returns in some proportion should result from it, and I think I shall be within the mark in doubling the quantities in future with this mode of working to what they have previously been.

In most of our great lead mines with the lead is associated blende ore in large quantities, which is selling at fair and remunerative prices, as well as silver in more or less quantities, which should act as a stimulus to the proper development of these mines. I do not think it will be denied that there is a feeling existing at present that lead mines cannot be made to pay, but I can see no reason on earth why they cannot be made to pay, and to leave a large percentage of profit to the shareholders, if properly worked. We have mines reported in your columns producing from 10 tons per fathom downward, which can be stoped away at less than 4*l.* per fathom on an average, and it is a mystery, if these mines are to succumb to foreign competition, and producing not half this quantity. The fact is that hand-labour, directors' fees, and heavy dues or royalties are what is killing these mines. If these are put right I believe some of our mines may soon become richer than they have ever been. Let us take the Van as an instance, which returned 600 tons of ore per month by hand-power. Well, they are now sinking Edwards' shaft by rock-drills, at the rate of 5 fms. a month, or nearly four times as fast as in days gone by, and Capt. Williams, the manager, stated at the meeting held on July 10:—"From what he had seen going down, he had no doubt whatever they have a great mine below, and he hoped in three weeks' or a month's time to see what the lode was like. His opinion was that they had a greater mine under the shaft than they ever had hitherto."

I believe every word of this is correct, and if so they will be in a position to return more than double the quantity they did return with the same agency, and better dressing apparatus than was before the case, and with the blende, the Van in a few months should be a richer and more profitable mine than it has ever yet been, and so may a great many more, who are working for directors' fees, and with a hope that mining capitalists will be content with a paltry 3 or 5 per cent. We have a good example set by Great Laxey of what may be done by home lead and blende mines, and it is only to follow that example to bring them out of their present most miserable state of sloth and poverty into one of prosperity and activity.

Goginan, Aberystwith, July 21. ABSALOM FRANCIS.

CIRCULAR MINING—CARN CAMBORNE AND CARNARVONSHIRE CONSOLS.

SIR,—If mining is to succeed it is, before all things, necessary that it should be conducted with strict integrity. The majority of the public who invest in mines never go down them, and if they did would be none the wiser. They must trust some one, and for this reason I think it is the duty of journalists to keep an eye on worthless prospectuses, and still more on the proceedings of dealers. With this view I send you the following facts:—In June, 1882, I bought of Messrs. Endean, of Gracechurch-street, 30 Carn Camborne at 1⅛, and 30 Carnarvonshire Consols at the same figure. I shortly afterwards received an invitation to double my holding as the prospects were so encouraging. I refused at that price, and was at once offered a parcel at 17s. 6d., which I also refused. The reports issued by the firm were most satisfactory, as your advertisement columns testify, especially last year, when the mine was reported to be on the eve of a splendid success. Holders were warned not to part with a share as there were designing dealers in the market selling below value in order to depreciate the property, and secure the shares for themselves.

In August last I wrote to Messrs. Endean to enquire what they could sell my shares for, and received a letter giving no answer to my question; but saying, "there was one thing they could not stand, seeing outsiders coming in to rob their clients of the magnificent profits in store for them." In the beginning of this year it seems that several others suspected all was not right: for I saw in the Standard of Jan. 15 that a solicitor summoned before the Lord Mayor both Carn Camborne and the Carnarvonshire Consols Company for refusing to supply him with a list of shareholders. Shortly after this a large holder threw all his shares on the market, and Messrs. Endean promptly responded, advising their clients to buy every share that could be got, as the mine was looking well, and they themselves had lately bought heavily at a large premium.

At last comes the meeting, when it has to be acknowledged that the fine prospects held out have utterly and entirely disappeared. I should mention that just before this a most ingenious ruse was adopted in the way of a circular, stating that application had been made to the directors for 1000*l.* of the unissued capital at par; but that the directors, in the interest of the shareholders, thought proper to give them all the option of taking a portion. It would be interesting to know how many were induced to avail themselves of this invitation.

At the end of last May I called on Mr. Endean, and was told he was in. As soon as my name was announced he was engaged, and sent his clerk. I instructed him to sell my Carn Cambornes, which he told me were at 1½, and left my address (at my son's, who lives in London). From that day to this neither I nor he have been able to see Mr. Endean, nor get an answer from him. I look upon the whole thing as most suspicious, and think the facts should be published.

The Farm, Little Malvern, July 16. R. S. MOODY.

BICTON SILVER-LEAD MINE.

SIR,—I am a miner and have had some experience, in having worked at the Menheniot Lead Mines several years, and as I now live near Pensilva, and am working on copper, I sometimes take a ramble down to Bicton Mine, which is only a short distance, and see what is doing there, and I am bound to say that it is, to all appearances at the surface, a most promising concern indeed. The work is very good for lead, and I should judge there is a good percentage of silver; indeed, I believe the greater part of it was taken out from the deeper levels; and by that, if the shaft were sunk deeper (say another 20 fathoms, at least,) and a good pumping-engine put in (say a 60-in.), and then drive north and south on their great lode with a large staff of men, I should think most probably Bicton would soon be on the Dividend-List. Until this suggestion is carried out, I cannot see that it can, although they have a fine water-wheel; but that could be put to work in other ways if there were plenty of ore to dress, which I have no doubt in if the mine is worked just as I have sketched above. There are also several other lodes in the sett which I consider well worthy of a trial, and one in particular that is underlying into the great one, and is a very good one indeed, and others parallel with it, which are all good. There is also a very fine copper lode traversing the sett, direct east and west.

If they drive the levels in the deeper parts of the mine they will assuredly cut their east and west lodes, and no doubt they will have something more than silver-lead to dress on their floors as they explore on the east and west lodes, for the indications at surface where those lodes have been opened up are very strong indeed. I think by all appearances the percentage of silver in the lead will be very high, and that it would be of great advantage to the mine, and cause more capital to be put into it, which would be a great good to Pensilva and the neighbourhood in general, as the copper mines are not employing much labour just now. I cannot find any fault with the management, which I consider very good and economical under the present agent and captain. I might just say here that anyone can see the ores at grass, even in stones in the roof of the levels without much trouble, and that it has continued improving in quantity and quality to the deepest levels.—*Pensilva, July 22.* W.

EAST WHEAL LOVELL.

SIR,—My attention has been drawn to a short paragraph in your last issue respecting the meeting recently held at the mine. Permit me to say that no one has been authorised to send you any *ex parte* statement, and that the meeting was duly convened and conducted, and the call of 1*l.* 5*s.* made in accordance with the Cost-Book System and the Stannary Acts. HENRY ROGERS,

Helston, July 23. Purser and Chairman.

ST. AGNES MINING DISTRICT.

SIR,—Among the natural phenomena of this parish, the peculiar strata of the hill on which St. Agnes Beacon is situated is singularly remarkable. On the side of this hill or mountain (its summit being 623 feet above the sea) the strata upon display has appeared in the following order:—The vegetable soil of the surface, and the common rubble or broken matter under it extends about 6 ft. in depth. Immediately under this there is a fine white and yellow clay, of which tobacco-pipes were formerly made. I believe the clay, which is adhesive, is now used by the miners to envelope their candles underground. This clay is about 6 ft. in depth. Beneath this is a layer of rounded smooth pebbles, such as the beach presents, mixed with sea sand. Beneath these, the hill is nearly 80 fathoms above the sea, and about 300 fathoms from the sea, another layer or stratum of pebbles about 5 ft. thick appears, many of which grains of tin have been discovered. Under these stones nothing but common spar stone land or earth is to be covered for 5 or 6 ft. deep; and beneath this the firm rock lies, and continues in the whole descent. Nor was this mountain, when it was opened as a mine, less singular in the riches which it afforded than in the various strata which were discovered. A considerable part of the ore (tin) was so rich that it needed neither pulverising nor cleansing, and in some places the lode was so large as to form large rocks of tin. One rock that was carried in March, 1[illegible] Calenick Smelting-house, near Truro, weighed 664 lbs., and was so pure as to yield 11¼ for 20 of metal. "I have since been informed," says Dr. Borlase, "that one stone brought to the melting-house from the same works weighed 1200 lbs. It is judged that the late Mr. Donithorne, who had the whole adventure, and who worked it at his sole expense, in a few years past, got at least 40,000*l.* by this mine, and much more he might have raised yearly if he pleased."—*Drew's Cornwall.*

It is not stated from what mine the rich ore was raised, but I suppose that it was from Polberro. There are, however, many other mines on or near the Beacon—West Kitty (now rich), Wheal Friendly, Trevaunance, New Kitty, Wheal Coates, &c. Trevaunance was worked by the ancestors of Mr. F. G. Enys for many generations, and it is said that 200,000*l.* profit was derived therefrom. West Kitty was originally called Wheal Rock, and worked unsuccessfully for many years, but perseverance—as in West Seton, Wheal Seton, West Frances Wheal Agar, &c.—has its reward in good dividends. If the same spirit were exercised in many mines now idle the like results would probably have ensued. Wheal Abraham was worked for many years without success, and some of the adventurers became tired, but one of them, a farmer, at a meeting saying, "I will venture my bullock upon the concern before I give it up" (or words to that effect), the company resolved to go on a little longer, and the mine was soon immediately after cut rich, and 200,000*l.* profits were subsequently divided. It is rarely that a mine is prosecuted so long as Wheal Agar (50 years) in expectation of success before it come; but it did come at length.

St. Agnes is a district rich in tin ore, and also in copper ore, and is likely to yield supplies of both for centuries to come—particularly of tin. Polberro is full of tin—so to speak—the whole rock is impregnated with it. A miner said to me many years ago that the miners had carried away to the stamps all the rock in the mine above sea level it would pay for returning." R. SYM[illegible]

Truro, July 17.

VAN MINING COMPANY.

SIR,—As I was obliged to leave London after the Van meeting last Thursday afternoon, I was unable to write in time my letter to appear in last Saturday's *Mining Journal* contemporously with the report of that meeting. I must, therefore, ask to insert a communication this week, in the hope it may be seen by many of the shareholders before the meeting is held to confirm the resolution passed on July 10. To rightly understand the position of the company's affairs it is necessary to go back to what took place at the last ordinary general meeting, held Feb. 21. The directors' report to that meeting states that the excess of expenditure over receipts for the year 1883 was about 535*l.*, which amount was taken from the reserve fund left a balance of 3776*l.* to the credit of that fund. The report gave the reason for this exceptional excess of expenditure over receipts, and went on to say, "The ordinary expenses and receipts nearly balanced." The following clauses were also in the report:—"It will be in the recollection of the shareholders that for some time past the western part of the mine at the bottom level has shown strong indications of developing a considerable course of tin. The favourable features are so marked that the manager recommends a speedy and special work for opening up this ground. He calculates it will need a sum of 5000*l.* to do this, and at this meeting the directors will call the attention of the shareholders to the necessity of raising this fresh capital, and the best mode of doing so can be discussed and decided on." And a recommendation was made that the 5000*l.* should be raised forthwith.

As the result of some questions I put to the Chairman he said—"Since the report of the directors was sent out the affairs of the company seemed in a brighter state. It would not be so absolutely necessary to immediately spend the sum of money which the directors anticipated doing at one time, but he was very strongly of opinion that it would be absolutely necessary to have that sum of money to fall back upon to supplement the reserve fund, as at any time there might be circumstances arising which would render it necessary to spend a considerable sum of money. Not that the directors anticipated anything occurring, but he believed that 200*l.* monthly, taking into consideration what they would get from the sale of lead and blende, would enable them to develope the particular point of the mine they were now at." As neither the Chairman or the manager gave any information as to what the circumstances were which might render it necessary to spend a considerable sum of money, and the amount of the reserve fund was sufficient to meet the anticipated loss of 200*l.* a month for more than a year, I moved an amendment—"That this meeting be adjourned for six months, that the question of raising more capital be postponed till that time." This amendment was carried unanimously. The object of the amendment was to give the manager further opportunity to inform himself of the nature and value of the new discovery, so that when the question of raising further capital came again before the shareholders they might be in a better position to judge whether more capital should be raised, and to what amount. No objection was made by anyone to raising fresh capital when the advantage of doing so was clearly shown, which the directors were certainly unable to do on Feb. 21.

At the beginning of this month the following circular was sent to the shareholders:—"Notice is hereby given, that a special meeting of the shareholders will be held on Thursday, July 10, for the purpose of considering the position of the company, and passing such resolutions as may be deemed desirable either for raising fresh capital or for winding-up the company." Accompanying this notice was a circular giving the reason for calling a meeting before the expiration of the six months previously fixed on, which ended with this clause—"The directors trust that the latter alternative—winding-up the company—can be averted, and that all shareholders who can possibly manage it will make an effort to be present at the meeting, so as to fully consider matters." You, Sir, may judge my surprise on entering the meeting shortly after business had begun to find

Chairman had proposed a resolution to wind-up the company without having hinted at any other alternative, on the grounds that the shareholders had not provided the capital to carry on the mine the directors had asked for. To my protest against this statement, and to an amendment moved by another gentleman to raise fresh capital, the Chairman replied that, there being only about 300*l.* of the reserve fund remaining, the company had not money enough left to keep the mine working for another month, therefore there was no time left in which to take the necessary steps to raise fresh capital, and rather impatiently insisted nothing could be done but pass the resolution as had proposed, and that if we would leave the matter to the directors they would do the best they could for the shareholders. Whether the reasons given by the directors for the decision they had come to were good ones is a matter of opinion; the majority of the meeting thought they were, and accepted the Chairman's resolution. But whether good or bad they never ought to have existed, and I think the shareholders have great cause to complain of want of candour on the part of the directors in not bringing before them the altered circumstances at the mine until the financial position of the company had become as desperate as they now state it to be. The fact that soon after the February meeting the three most productive stopes in the mine had collapsed, so that the monthly return of ore was obliged to be reduced from 200 tons to 100 tons, must have told them that if fresh capital were to be raised it must be done before the six months had expired, and there was no reason given, and none is conceivable, why the special meeting was not called at the end of three months, when ample time would have remained to raise the necessary capital or reconstitute the company. I doubted at the time the prudence of the decision come to by the meeting on Feb. 21 to leave the company's affairs in the hands of only two directors, but from what was then said it did not seem as if much harm could accrue during the six months for which the meeting was adjourned. It was my intention last week, had the proposition to raise fresh capital been carried, to suggest that a small committee of shareholders be elected to look thoroughly into the position of the company and the mine, and to assist the directors in determining the amount of fresh capital to be asked for, and the best course to pursue to obtain it.

It is strange that shareholders take so little interest in what is done with their property as appears generally to be the case, especially when a concern falls into adversity—the very time one would think it required the most careful looking after. W. H. GATTY.

Market Harborough, July 16.

DERBYSHIRE MINES, AND THE LEAD MARKET.

SIR—The short paragraph in the *Mining Journal* of July 19 relating to the lead market would be hailed with deep satisfaction by all investors in lead mines, but more especially those in Derbyshire and the North of England, as the percentage of silver in these mines is not such as to be materially felt in the price of their product. The present condition and prospects are such as to warrant being sanguine that the silvery lining to the dark cloud under which lead mining has been for sadly too long a period has at last hove in sight. Artemus Ward's advice is not to prophecy unless you know, and I am inclined to think that it is wholesome notwithstanding, taking all things in connection therewith. The signs of a permanent improvement in the lead market are much better than they have been for a considerable time, and in anticipation of which we may reasonably look forward to increased activity in the industry. For some time the industry has been in a critical position, and many are the complaints which have naturally arisen in consequence, and even now, unless the price of lead speedily advances it is to be feared other mines must succumb to the price still offered, and in my opinion every nerve ought to be strained to sustain life in those concerns which are gasping for breath. Plenty of wind is on the way if we can only wait for it. A very little would turn the balance in favour of some of these mines, or in other words a few pounds more per ton for lead would place them in a position to pay profits. Where the water charges are heavy, with the price of lead at from 6*l.* to 7*l.* per ton, there is no wonder at the losses from time to time recorded in these columns at some of our principal mines. Very few mines in Derbyshire are leaving a profit at the end of the month, when all charges are cleared off, although in some cases the output of ore is considerable.

The Dolcoath of the county, Mill Close, owned by Mr. Wass, is still working on the right side of the ledger, and in a great measure the reason of this is that he is working his mine with the most improved machinery. Only recently he has erected a substantial and valuable dressing plant on the principle of continuous jigging. The lack of this and other machinery on some of the mines is a serious drawback to their success. Mr. Wass is a large smelter, and thereby gets all the profit he can from the mineral. One splendid advantage in the majority of Derbyshire mines is that they are so situated that each one can without damage to land of value erect furnaces to smelt their own ore. The principal mines in the county are held by Sheffield gentlemen, who for their pluck in sticking to them through the depression cannot be too highly commended. The proprietary of the Mill Dam in their new venture, Silence Mine, under the able and energetic management of Mr. Horatio Bradwell, have placed their property in a position that a slight advance in the price of their product would leave them a profit and ensure success which they richly merit. The miners on and about the Peak are under an obligation to Mr. Bradwell for the tenacious manner he has clung to and supported the industry. Mill Dam in the past has been a rich prize, and is only waiting a better price of lead to resume its old position.

The Sheldon Mining Company are showing much spirit in driving a cross-cut from their deep adit to intercept four or five veins known to be highly productive in former working—the Magpie vein is one. The success of this undertaking is almost assured, as they have no water charges to contend with, and have facilities for working their property which very few companies can boast of. The dues throughout the county, comparatively speaking, are not heavy, and if lead had maintained anything like a price would not be so acutely felt as now; 1-20th is about the average. Doubtless if the matter was seen to in proper quarters the miners' heavy burden might be eased as the Duke of Devonshire has in more than one instance proved to be the miners' friend. W. NINESS.

Peak Forest Mines, July 23.

SHROPSHIRE LEAD MINES—FALL OF THE SMELTING WORKS CHIMNEY STACK.

SIR,—At the Old Snailbeach Mine, perhaps some 25 years ago, new smelting works were erected near the mining works here, a large and convenient flue was made from the new works for a distance, we should say, of ½ mile up to a point on the Resting Hill, a little above the pumping and winding engines. We have not heard any fault whatever found with architecture of either the furnaces or the flue. But that a great mistake was made in the construction of the chimney (which was about 90 ft. high), was evident to all. Considerable expense has been gone to cramp it and stay it with wire-rope, &c., but, however, it fell on Friday last, and this tends to confirm us in the belief of the old adage, "That one trouble seldom comes alone." Owing to the low price for lead only a few smelters have been kept at work for some time past, but this misfortune will throw those few out of employ. As we have before said, the old mine looks well in the deepest workings, and has a capital outfit in the shape of engine and general plant. The question in the neighbourhood at present is what could could be done at a little cost to carry on the smelting to pay the working expenses of the mine until the price of lead goes up a few pounds a ton; some say a few feet built on the bottom of the chimney which is left standing would do for a short time. Others say there is an idle chimney stack on the mine, and that a short flue run to that would answer for the present. We most sincerely hope that the company will take into consideration the poverty of the neighbourhood through the other mines being idle, and that they will keep as many hands on as ever they reasonably can. We hear that the dressed lead ore and blende is being sent off from the Tankerville Great Consols Mines, and that the miners are to be paid one month's money in full on Friday in next week.

We hear a bad account from South Roman Gravels Mines and from the Roman Gravels—that several of the miners are owed 20*l.* and upwards each, and are not certain of ever having it. We think directors should stop the works when the funds are exhausted, and not serve the workmen in this way. MINER.

WHEAL CAMBORNE, AND CAMBORNE VEAN.

SIR,—"There are as good fish in the sea as ever came out of it," and the deepest workings of Dolcoath seem to show that there are inexhaustible supplies of tin in depth, for the deeper they sink the richer it becomes. Its neighbours on the east see this clearly enough, and are sinking as quickly as they can, but what about those on the West Camborne Vean and Wheal Camborne? A letter in the *Mining Journal* last week dated from Redruth states that "this subject now engrosses the attention of mining men in this district." If this be so it is a hopeful sign, but it should be clear to everyone that what is wanted is not two weak companies with limited means, but one powerful company with ample resources to sink the principal shaft with boring machines, and so develope it as speedily as possible. Wheal Camborne adventurers, before spending their money in the way they propose should meet in a body on Camborne Vean Mine. They have then only to turn their faces eastward to see that the great burrows and stacks are all in a line before them, showing that the champion lodes of Dolcoath pass directly through Camborne Vean, and that they do not turn aside into Wheal Camborne.

The latter mine has undoubtedly the old Dolcoath silver lode and Water Style lode, which appear to run under the town of Camborne, and are called the Town lodes, but the main shaft in Camborne Vean is already sunk 320 fms. from surface on the great Dolcoath lode, as the agents of the great mines of the district agree, and a few fathoms further sinking will in all probability show a lode worth 200*l.* a fathom on the western side of the boundary as in Dolcoath on the eastern side of the same boundary, the lode in the bottom of this shaft being 10 to 12 ft. wide with ground precisely similar to that at Dolcoath at the same depth, and yielding tin to the same value. Wheal Camborne adventurers, to be successful, should, therefore, secure Camborne Vean if at a reasonable cost.

July 21. A LOOKER ON.

IRISH MINES.

SIR,—I am well aware that you feel greatly interested in the prosperity of Irish mines, and will thank you to insert the following remarks in next issue of the Journal:—A few days since an important discovery of rich copper ore was made in the adit level of an old abandoned mine in West Cork. The ore consists of green carbonate (malachite) and black oxide of copper, yellow copper ore, and rich bell metal, copper ore coated with black oxide of copper, small pieces of which when held in the hand explode with a smart crackling sound, and splinter and crumble into small bits. Perhaps some of your numerous readers will explain the cause of this curious phenomenon.

The discovery of the lode in question is of great importance and value, some of the ore giving by assay from 45 to 50 per cent. of pure copper. The lode has not yet been cut through or its width ascertained, but it is intact in virgin ground for more than 500 fms. in length. None of the lodestuff gives less than 12 per cent. by assay.—*July* 21. OLD CORRESPONDENT.

FOREIGN MINING AND METALLURGY.

The condition of the Belgian Coal Trade is only moderately satisfactory, some descriptions being only disposed of with difficulty. No reduction has, however, been made in quotations, prices being too low already to allow further concessions to be made. Firmness has been generally the order of the day in the Couchant de Mons, although coal for metallurgical purposes has been rather indifferently supported. The Administration of the French State Railways has just invited tenders for 160,000 tons of fuel required for the lines (coal or briquettes). The condition of the German coal trade has remained generally unchanged. On the one hand, the production continues to increase to a large extent; but, on the other hand, the exports are still making progress, so that prices are still maintained at a fairly satisfactory level, although quotations for coking coal and coke have shown a certain weakness. Production has been restricted to some extent in the Essen district. In the Dusseldorf group business in coal is feeling the influence of the present season of the year—in other words, it is characterised by less activity. The Austro-Hungarian coal trade has been agitated by a war of tariffs which now prevails among the companies working the lines of Bohemia, which comprises the principal coal basins of the Austro-Hungarian monarchy.

Tenders have just been delivered for 14,000 tons of Vignolls steel rails required for the Belgian State railways. The prices named in the tenders were very low, the John Cockerill Company offering to supply 4500 tons at 5*l.* 5s. 10d. per ton; the Ougrée Company 2000 tons upon similar terms; the Thy-le-Château Company, 2500 tons upon similar terms; M. Boet, of La Louvière, 2000 tons upon similar terms; the Angleur Works, 3000 tons upon similar terms, and a second lot of 3000 tons at 5*l.* 8s. per ton. The 14,000 tons will be divided amongst the five firms according to their tenders. The last adjudication took place Dec. 27, 1882, and the lowest tender upon that occasion was that of Charles Cammell and Company (Limited), of Sheffield, England, who offered to supply 2000 tons at 5*l.* 15s. per ton, the lowest Belgian tender being 5*l.* 17s. 7d. per ton. English casting pig has made 2*l.* 2s. 6d. per ton upon the Belgian markets. Hard refining and Belgian pig has brought 2*l.* per ton; ordinary ditto, 1*l.* 16s. per ton; and mixed ditto, 1*l.* 12s. per ton. No. 1 iron has been quoted at 4*l.* 10s. per ton for exportation, and 4*l.* 12s. per ton on home account; No. 2 has made 4*l.* 16s. per ton; and No. 3, 5*l.* 2s. per ton. Girders have made 4*l.* 16s. to 5*l.* per ton. No. 2 plates have been quoted at 6*l.* 4s. per ton, and No. 3 ditto at 6*l.* 4s. per ton.

The intelligence received with respect to the French Iron Trade is not of much general interest. There are rather considerable stocks on hand, and new orders are scarce, so that the less important firms are exposed to great temptations to accept orders below the currently quoted rates. Prices of iron have been rather feebly maintained upon the German markets. The German steelworks have still a good current of orders, but pig has shown weakness, and iron has been in no great demand. Delegates of the forges of Upper Silesia have just held a *réunion* at Cattowitz. According to the reports submitted to this meeting, the production of all the works is fully engaged for four months and a-half, while the stocks on hand would scarcely meet the demand for a fortnight. Nevertheless, the works show no disposition to advance their minimum bases price, which remains fixed for bars at 5*l.* 5s. per ton, delivered at the works. The works appear to have decided to adopt this strictly prudent and moderate policy, in order to avoid attracting to the district the competition of the Rhenish provinces and Westphalia. The production of iron in Upper Silesia last year amounted to about 78,000 tons, so that the district is one of considerable industrial importance. The Austro-Hungarian iron trade is feeling for the present the full effects of the dead season.

TELEPHONES IN JAVA.—It was intended in the beginning of 1883 to extend the telephone connections to the upper town of Batavia. Permission having been obtained from Government in June, 1883, to construct overhead wires, this extension was carried out in the latter half of the year, and a central telephone office was opened on the King's Plain (upper town) in November. In the lower town the signal office, the Custom-house, and the harbour of Tandjong-Priok are now placed in communication with the central office. Last December there were in all 123 subscribers in Batavia, while in Samarang and Sourabaya, where the same company is engaged in erecting telephones, there were respectively about 70 subscribers. The total number of connections at the end of the year was 3296, as compared with 1307 in 1882. The tariff has now been reduced, as contemplated, to an uniform one of 15*l.* per annum, clubs only paying 30*l.* a year. The telephones in use are the Gower Bell, Paterson's Micro, and the Bell Blake models.

THE LIXIVIATION OF SILVER ORES.—No. III.

If concentrated solutions of the reagents are mixed the cuprous hyposulphite double salts soon begin to precipitate as a crystalline powder, and continue to do so until finally the solution contains very little cuprous hyposulphite. The more concentrated the solutions are the more rapid and complete is the separation. This shows that these double salts are almost insoluble in concentrated solutions of sodium sulphate [and tetrathionate]. If the clear solution is decanted from the precipitate the latter can be more or less dissolved by water, especially if warm. A diluted sodium hyposulphite solution, however, is a much better solvent than pure water. In case the reagents have been mixed in the proportions expressed by equation No. 1—nine parts sodium hyposulphite to five parts copper sulphate, the clear liquid above the precipitate is almost free from copper and sodium hyposulphite. The yellow precipitate contains 33·7 per cent. copper, which corresponds exactly with the formula of the ⅔ salt of Lenz. This salt is almost insoluble in water. Its solubility in sodium hyposulphite solutions is materially affected by the concentration of the latter.

Concentrated solutions are much poorer solvents than diluted ones those of 1 to 2½ per cent. concentration acting most energetically. These solutions most likely contain the double salt of Lenz, having the formula $3Na_2S_2O_3$, $Cu_2S_2O_3$ + aq. Mr. Russell found that the ⅔ salt can be kept moist or dried at a temperature of about 40° C. without decomposing. In attempting to get it dry at a much higher temperature rapid decomposition took place. The solution of the ⅔ salt in aqueous hyposulphite of about 2 per cent. concentration is quite permanent, and can be heated to 70° or 85° C. without decomposing. At higher temperature it turns dark, and copper sulphide commences to separate. As soon as decomposition has been started it increases rapidly on account of the formation of free sulphuric acid. Extra solutions prepared from calcium hyposulphite are about equal in effect to those in which the sodium salt has been used. The potassium cuprous hyposulphite, however, acts with much less energy.

III.—THE REACTIONS OF THE EXTRA SOLUTION.

12.—SOLUBILITY OF METALLIC SILVER IN EXTRA SOLUTION.—This subject is of considerable practical importance, and Mr. Russell has furnished me with ample material, the publication of which, in detail, would be more confusing than interesting. After eliminating a few conflicting statements, and making allowance for slight errors unavoidable in such experiments, I have formulated the following laws from the results:—1. If the same quantities of sodium hyposulphite and copper sulphate are dissolved in varying quantities of water the dissolving energy of the solution is not materially increased with its concentration. In the experiments made the concentration of the solutions varied between 2 per cent. and 20 per cent. in $Na_2S_2O_3$ + 5aq.; and from 1 per cent. to 10 per cent. in $CuSO_4$ + 5aq. —2. If, to a hyposulphite solution of constant strength, variable quantities of copper sulphate are added the dissolving energy of the solution is not increased by concentration in copper, after so much copper sulphate has been added that its weight is about one-half that of the sodium hyposulphite.—3. An extra solution at 50° C. acts more energetically than the same solution at ordinary temperature (say) 15° C., but the difference is much less than in treating metallic silver with ordinary solution.—4. The best effect, under equal conditions, obtained with extra solution on metallic silver is about nine times as great as with ordinary solution, if both are used cold; and only about three and a-half times as great if the solutions are heated to 50° C.

13.—SOLUBILITY OF METALLIC GOLD IN EXTRA SOLUTION.—A series of experiments was made as in section 2, but the results were substantially the same. The dissolving energy of an hyposulphite solution upon metallic gold is not increased by the addition of a copper salt.

14.—SOLUBILITY OF A SILVER SULPHIDE IN EXTRA SOLUTION.—I have already stated that in decomposing Ag_2S by extra solution copper sulphide is formed. Mr. Russell failed to get accurate results in determining the amount of copper so precipitated for reasons previously stated. The copper found was always more or less in excess of the theoretical quantity called for. This is caused by the precipitation of a cuprous hyposulphite double salt from more concentrated solutions. Hence, the detailed results of these experiments have no special interest. In summing up Mr. Russell's numerous experiments on the decomposition of Ag_2S by extra solution I find the results correspond with the laws established in section 12 on the solubility of metallic silver. These laws not only become more prominent since we meet with no conflicting figures, but the second law is established beyond a doubt. The effect in every case is a maximum when the solutions contain for one part copper sulphate about two parts of sodium hyposulphite.

In comparing the effect of standard extra solutions (I give this name to the solution which has for one part copper sulphate about two parts sodium hyposulphite) of different concentration we find that the more dilute solutions act with much more energy than concentrated ones considering the quantity of reagents they contain. Averaging a number of experiments, 1000 c.c. of a standard extra solution with 1 per cent. $CuSo_4$ + 5aq. dissolved 0·645 gm. silver, while a solution with 5 per cent. $CuSO_4$ + 5aq. dissolved 0·808 gm silver only, although the latter contained five times the amount of reagents. Their relation is considerably modified when a large surplus of Ag S is used. . . . The rationale of all the results recorded becomes evident when we consider what has been stated in regard to the properties of the sodium cuprous hyposulphite double salts. If extra solutions are prepared, as was done in these experiments, a large portion of the cuprous hyposulphite must at once separate in minute crystals even if their formation is not immediately perceptible. It is only the solution which reacts, and not the precipitate. The more concentrated the solutions are the more rapidly will the formation of the precipitate take place. Hence, the comparatively better effect of dilute solutions. An excess of copper sulphate above the standard proportions favours the formation and precipitation of the least soluble ⅔ salt, and the solution becomes at once weak. On the other hand, if there is a considerable excess of sodium hyposulphite, the solubility of the most soluble double salt is materially decreased, and also in this case the solution will hold less of the reagent. For these and other reasons it is more profitable to prepare the extra solution by forming the precipitate first, and then dissolving it in a dilute sodium hyposulphite solution.

15.—SOLUBILITY OF GOLD SULPHIDE IN EXTRA SOLUTION.—Au_2S_3 is readily decomposed by extra solution. In investigating this subject Mr. Russell obtained rather irregular figures. It seems that the temperature at which the Au_2S_3 is precipitated by H_2S, and various other conditions influence the result. In the following experiments 0·500 gm. gold were dissolved in aqua regia, and precipitated with H_2S. The Au_2S_3 was treated with 1000 c.c. of a standard extra solution containing 1½ per cent. $CuSO_4$ + 5aq. After one hour 0·460 gm. gold had gone into solution; after an hour and a half another sample showed nearly all gold—0·482 gm. dissolved. In this case, too, copper sulphide is precipitated. In another series of experiments 1·333 gm. gold were in each case converted into Au_2S_3 and treated with extra solutions of varying concentration, and at different temperatures. The solution acts best at a moderate temperature, and heating it seems to be of no benefit. The maximum effect of the standard extra solution was not clearly established, but an injurious effect was observed by an increase of copper sulphate.

16.—SOLUBILITY OF SILVER ARSENATE AND ANTIMONATE IN EXTRA SOLUTION.—Extra solution produces no effect on Ag_3AsO_4 differing in any way from that recorded in section 5. The same is to be said about silver antimonate.

In another part of the paper the author says, with regard to the electrolytic process, that in Europe the tendency is at present very much in favour of the electrolytic process. The complete separation of the precious metals, and the great purity of the electrolytic copper, provided the process is conducted with the necessary precautions, are strong arguments in its favour. First successfully introduced in England, it has been in operation for several years on the continent, especially in Germany. The principal works there are those at Hamburg, Oker, and near Eisleben. The details of the process are everywhere guarded with the utmost secrecy, and admission to the works is generally refused No literature of any value from a

technical stand-point exists. Prof. Hampe, of Clausthal, so well known to metallurgists through his researches on copper, after investigating the electrolytic process in a most thorough manner, had written an exhaustive treatise bearing on all practical questions. Its publication was officially suppressed. Such bureaucratic folly still exists in Prussia! If officers of the Government are allowed to act in such a mysterious way—this takes us back to the times of the alchemists—we cannot expect that a firm in Hamburg should be more liberal. This spirit of narrow-minded illiberality is fast gaining ground in the metallurgical works of Germany, and wherever the student goes he is no more received with the cordial frankness of former times. Even the Ziervogel extraction works of the Mansfeld Company are now closed to visitors, simply because the general manager was at some time refused admittance to silver extraction works in Swansea. But are there in fact such awful secrets about the electrolytic process as this policy would indicate? And is it surrounded with such enormous technical difficulties as all the managers of European works seem to imply? My answer is in the negative. That these gentlemen have finally achieved a great success after a long series of blunders nobody will deny. But it seems to me they would have reached their goal much sooner if they had paid a little more attention to well-established laws of electricity. That the working of copper matte by this process proved to be a failure might have been anticipated beforehand. The notion that any copper, no matter how impure, could be treated by it with economy might also have been condemned in advance. The electrolytic process permits the use of currents of low intensity only. With increased differences in the composition of the electrodes, the difference in their electric potential also increases, and a marked polarisation of the current must be the result. But perhaps of still greater importance is the durability of the copper solution in which the electrodes are immersed. Certain impurities concentrate in this solution more and more, and are finally precipitated on the cathode. The peculiarity of arsenic to precipitate the sooner on the cathode, the lower the electric current is in intensity, was also known to physicists before it made itself felt in electrolytic works. That the process does not offer great technical difficulties, or require an experience of several years, has been demonstrated by its successful introduction at the metallurgical works of Mr. Balbach, Newark, New Jersey. The plant of 800 lbs. daily capacity is by no means a model of construction, but it works well and with profit. Mr. Balbach claims no secrets, and admits with pleasure everybody belonging to the profession.

There is no doubt that the electrolytic process offers many advantages compared with other processes, both in economy and perfection; but the large capital required for the plant and buildings, the extensive area covered by the latter, and the enormous quantities of metal in rotation are a bar to its introduction on a large scale. In this country especially capitalists are not inclined to invest so much money for such purposes. Hence, it is a question whether it can compete with those processes which are based upon the regeneration of sulphuric acid, and require a comparatively inexpensive plant.

Comparing calcium and sodium sulphates as precipitants for silver it is remarked that Guido Kustel states—and this has been copied by others—that in using calcium polysulphide the sulphides precipitate quicker and settle better than with a sodium polysulphide. This statement is not confirmed, but contradicted by Russell's experiments. In working on a large scale the sulphides precipitated by sodium monosulphide or polysulphide settled without difficulty and in a short time, and the effect of calcium sulphide did not show itself to be superior in any respect. On the contrary, sodium monosulphide proved to be infinitely better than calcium pentasulphide. Indeed, it is not possible to advance theoretical reasons to support the superiority of calcium polysulphide. Using the pentasulphide which is mostly obtained four equivalents of sulphur are wasted, and appear as free sulphur in precipitating the lixiviation solution. To regain this free sulphur either by distilling the sulphides in an iron retort or by boiling them with caustic lime, as has been proposed, seems to me objectionable, and not profitable. The distilling process would leave the sulphides in a condition requiring pulverising for subsequent treatment, and the operation needs an expensive plant, and is costly. In boiling the sulphides with caustic lime we run the risk of having impurities of the lime, and insoluble calcium monosulphide, and sulphate with the sulphides, whereby their treatment becomes more difficult. A much better method would be to boil the sulphides with an excess of caustic soda. The solution so obtained could be treated with more sulphur, and converted into a normal solution for precipitating.

Another point against the use of calcium sulphide is the fact that gypsum is precipitated with the sulphides, whereby their subsequent treatment becomes more troublesome.

Mr. Russell found that calcium sulphate is practically insoluble in a solution of calcium sulphide. (And also in sodium sulphide.) Hence no gypsum can enter the lixiviation solution from this source directly. If to a calcium sulphide solution a soluble sulphate is added, for instance that of sodium, a precipitate of gypsum appears immediately; and if to a sodium hyposulphite solution, containing sodium sulphate or any other sulphate, calcium sulphide is added gypsum is formed, which in part remains in solution, and in part is thrown down with the sulphides.

The fact that calcium sulphate is insoluble in a sodium sulphide solution can be turned to a practical account in removing from the latter any sodium sulphate it may contain. It is only necessary to add gradually a solution of calcium sulphide as long as a precipitate appears. In preparing sodium sulphide from caustic soda the amount of sulphate formed is trifling, but the commercial caustic soda may contain an appreciable percentage of sulphate beforehand.

With regard to the economy of the process, Mr. Stetefeld says: To any professional colleagues it is hardly necessary to point out the economy of Russell's process. Without entering into detailed calculations I will only point out the principal items which are in favour of lixiviation as compared with amalgamation.

1.—In amalgamation the fineness to which the ore has to be crushed is determined by the capacity of the settler to work off coarse sands without loss of quicksilver. It is not practicable to use a coarser screen than No. 30 if the crushing is done by stamps. This is almost equivalent to sifting through a No. 40 revolving screen if the crushing is done by rolls. In lixiviation pulverising as coarse as possible is desirable. The limit of coarseness is determined by the roasting process. It depends upon the character of the ore, and principally upon the manner in which the silver-bearing minerals are distributed in the gangue.

2.—The original cost of the lixiviation plant is much lower than that of pans and settlers. A further saving is effected by a reduction n size of the engine and boilers

3.—In amalgamation the pans and settlers consume not less than 1½-horse power per ton of ore. The power for pumping solutions, &c., in the lixiviation process is merely nominal.

4.—In large mills the quantity of quicksilver in rotation represents a capital of from $30,000 to $40,000, while the stock of chemicals required for lixiviation does not cost more than 1-10th of this amount.

5.—With Russell's improvements the percentage of silver extracted by lixiviation is much higher than by amalgamation.

6.—Lixiviation by Russell's process requires a less careful chloridising roasting. That in many cases the salt may be dispensed with is indicated by Ontario experiments.

7.—The value of the lost quicksilver and cost in wear and tear of the pans and settlers amount to more than the cost of the chemicals consumed in the lixiviation process.

8.—The lixiviation process permits the extraction of copper and ead as valuable bye-products.

9.—The sulphides from the lixiviation process can be much more easily converted into fine bars, and the gold parted, than can be done with the bullion obtained in amalgamation.

10.—Amalgamation is invariably injurious o the labourer's health.

If we take, finally, into consideration—first, the enormous reduction in the cost of crushing silver ores dry by the successful introduction of Krom's steel rolls in place of stamps; second, the possibility of lixiviating with profit some classes of silver ores after they have been subjected to an oxidising roasting only; third, the possibility of lixiviating many so-called free milling ores without previous roasting, including tailings resulting from amalgamation of roasted or raw silver ores, we may expect a revolution in the reduction of silver ores, and a cheapening of the process rarely witnessed in the history of metallurgy.

COMMERCIAL PROGRESS IN ECUADOR.—The year 1883 has, writes Mr. CONSUL CHAMBERS, been an exceptional one for Ecuador from the fact that, during the first half of the year, all communications with the districts of the interior were closed, and the commercial transactions, both as regards the import and export trade, were carried on with only the coast provinces. This was owing to political movements, the greater part of the nation having risen against General Veintimilla, the President of the preceding Constitutional period, who had caused himself to be declared supreme chief of the Republic, and had established himself in Guayaquil, where he resolved to sustain himself against his opponents. On Jan. 10 the capital, Quito, was taken possession of by the opposing party, and Esmeraldas, the northermost province of the Republic on the coast, was taken about the same time; but the military operations lasted till July 9, when the city of Guayaquil, the last hold of General Veintimilla, was attacked and captured by the forces of the Provisional Government. These events were naturally very detrimental to commerce, and it was only in the latter half of the year that business could be carried on upon a proper basis. The Bank of Ecuador has declared a dividend of 33 per cent. on the paid up capital of $805,000, and has presented to the municipality the usual donation of $10,000, and added to the reserve fund the sum of $57,043 (about 7500*l.*). At the end of the year the balance of the $10,000 unpaid up shares was called in; so that the capital is now increased to its full amount of $1,000,000. It has also been arranged at the general meeting to increase the capital of the bank to $1,500,000, by the issue of new shares. The Government debt to the Bank of Ecuador has been increased during the past year to $1,220,616 (160,000*l.*), and at the same time various local debts have been incurred with tha Quito and Union Banks and others, amounting in the aggregate to about $554,876 (75,000*l.*). No alteration has taken place in the foreign debt, and no move has been made towards its settlement.

ENGLAND'S INDUSTRIAL SUPREMACY IN THE MANUFACTURE OF IRON*—No. III.

BY SIR FRANCIS C. KNOWLES, BART., M.A., F.R.S.

We now come to the oolitic red peroxide, or oligiste iron ore of Belgium. This ore, well exemplified in the violet ores of Houssoy and of Vezin, is found in beds conformable with those of the carboniferous system of limestone, therefore more ancient than the coal, and constitutes a special formation of anhydrous oxide of iron. It is composed of minute grains of oolithes, black or of a deep metallic grey, cemented together by a red cement of red oxide of iron nearly pure. It has been formed in its site, and is worked like coal. Although it contains a small quantity of phosphoric acid, arising from the original oolite, yet mixed in the proportion of one-fourth in the charges, it gives a good strong metal. It must not be confounded with the true red hematites of Cumberland, Lancashire, Wales, and the West of England, which it in no way resembles, and to which it is very inferior. Its geological position is between the lower limestone with the upper quartzo-schist and the upper limestone with the dolomite. This may be seen at Houssoy and Vezin, in the province of Namur, on the left bank of the Sambre. It cleaves readily into regular rhomboids, some quite smooth on the faces, and coated with carbonate of iron. It often incloses nodules nearly ¾ inch in diameter, containing as much as 15 per cent. of phosphoric acid which must be very carefully separated from the ore. It yields in the crucible from 58 to 59 per cent. of hard and tenacious cast metal with a violet coloured cinder testifying the presence of manganese. The mineral is composed as follows:—

1.—Oligiste of the Lower Meuse, near Courthuin, province of Liege, called Melotte:—	Hard Melotte.	Soft Melotte.
Volatile matters	9·50	10·90
Vitrifiable matter	10·00	13·65
Cast metal	56·10	55·80
Oxygen combined	24·30	19·00
	100·00	100·00

2.—Oolitic oligiste of Isne, province of Namur:—	
Volatile matters	3·00
Vitrifiable matters	20·55
Cast metal	55·30
Oxygen combined	21·05
	99·90

3.—Violet oligiste:—	
Peroxide of iron	83·50
Silica	10·00
Carbonate of lime	4·60
Alumina	1·40
Oxide of manganese and loss	·50
Iron, 58·35.	100·00

It is needless to multiply analyses of this ore as the above fairly represent the average; but there is one important omission which we must supply. We have already indicated phosphorus as one impurity in this ore, but we feel it to be just to mention another, sulphur, which these reports do not notice. Now, the writer of these lines was accidentally present at an assay which is decisive upon this point. The object was to find an ore sufficiently pure for making steel iron, and the oligiste of Sclayneux was selected as the best. About 50 lbs. of this ore were inclosed in a large crucible, the ore covered up carefully, and the lid of the crucible well luted on with clay. The whole having been submitted to a strong red heat in a wind furnace for three hours the pot was opened and its contents spread upon the floor of the melting-house. The odour of sulphur evolved from it was so powerful that the heap could not be approached. It is probable that the loss by calcination given above in 2 represents sulphur, and that 3 represents the calcined ore. We have been particular upon this point of purity, especially as to sulphur, because this oligiste is the ore with which the puddling furnace is garnished in Belgium, an operation upon which we shall have something to say when we enter upon a final *résumé* and comparison between the two rival systems of manufacture in Belgium and in England.

Taking the mean of 36 ores smelted at Seraing in 1846 (M. Valerius), we find the price at the works to be 9s. 8¾d., independently of a second washing or calcination. The average of the yield of these in the blast-furnace was 36 5-7ths per cent.

Taking the mean of 35 other ores smelted at Seraing the yield was 34 per cent.

The average price in 1847 of 29 ores delivered at Ougree in 1847 was 12 frs. 19 c., or about 9s. 8d. per ton. Of the 51 ores above smelted at Seraing, 9 yielded strong iron of first quality, 12 of second quality, and 3 of third quality. Again, 6 ores yield soft iron. Lastly, 16, 3, and 2 ores yield Nos. 1, 2, 3 foundry pig metal respectively.

In all these ores there is one distinctive feature—the large predominance of silica, and the almost total absence of alumina, thus rendering necessary, in many cases, the addition of shale or clay, which, while it diminishes the richness of the charges, increases the quantity of cinder to be smelted and the consumption of fuel. One exception has been noticed by M. Valerius, the minerals of Fraire, in the Entre-Sambre et Meuse, which possesses the fluxing property in a high degree, economising coke and yielding very strong iron. M. Valerius calls it "the most remarkable mineral of the country," and no doubt its properties are due to the alumina it contains, for direct experiments prove that the silicate and bisilicates of lime and alumina, especially those combined with a very minute dose of silicate of the protoxide of iron are fusible at the lowest temperature. In Belgium the minerals of the same vein vary so much in their earthy ingredients that it is necessary to combine in the charges a great variety of ores with the greatest nicety of skill. As to the quality of the iron produced, all experience teaches that that which results from aluminous minerals is the strongest and best. Such is invariably the old cold-blast iron of England and Wales. "In many parts of Belgium," M. Valerius observes, "where the minerals are refractory and siliceous, it is not possible to obtain without admixture any but iron devoid of malleability, cooling quickly, cracking under the rolls, and unfit for the production of sheet or plate iron, and there can be no doubt that such ores must cause great difficulty to the smelter from their tendency to produce scouring, or even obstruction ("gobbing up," *vulgo*) in the furnace. The limestone of Belgium appears, from the analyses before the writer, to be rich in lime† and pure, and in many places the dolomite (magnesian limestone) is available to supply a second base to the silica in the formation of the cinder, a point, we need not say, of great importance, though nothing can compensate for the absence of alumina except the potash in a wood charcoal furnace. This observation naturally leads us to the consideration of the coals of Belgium.

COAL AND COKE OF BELGIUM.—The coal basin of Belgium contains what are called in the phrase of the country "fat" coals and "lean" coals, but they all require to be coked before they can be employed in smelting, not only to prevent their obstructing the blast and the functions of the furnace by their agglutination in mass, but in order to dispel the sulphur with which, combined in pyrites, they are largely contaminated. In many cases this is wholly insufficient, and at Charleroi and elsewhere (as in France) the coals undergo washing, and even grinding, in order to expel this injurious element, before they are put into the coke ovens. This necessarily enhances the cost of the coke, if it does not diminish the yield. Messrs. Williams and Creed are not far from the truth when they put down the price of coal at from 8s. 4d. and 10s., the average being about 9s. 7d. To this, where adopted, the cost of washing is to be added, and the loss in weight. From the tenour of Messrs. Creed and Williams's observations one would suppose that there was no bituminous coal in England and Wales.

The cost of coke at Seraing, as determined a few years ago by M. Valerius upon a large scale of operations, was found to be 16s. and prices have not much varied since, so if we assume 18s. as the limit we shall not be far from the mark. The yield of coke varies from 67 (at Seraing) to 68 (at Couillet) per cent. Of its quality, M. Valerius says that for foundry iron and for foundry purposes the coke is selected with the greatest care and particularity, which speaks volumes as to the general quality of the Belgian coal in point of purity. According to tables given by M. Valerius, in 1851, of furnace work at Seraing, the quantity of coke was from 2 tons to 2 tons per ton of metal during 24 hours, but the average for ten months was as follows:—

Coke per ton of metal	Tons 2·14
Yield of ore per cent.	35½
Cost per ton of metal—	
For finery	£3 12
For foundry	4 8

At Esperance the average cost of pig metal was 3*l.* 12s., and Couillet, 3*l.* 18s. This was in 1846. Messrs. Creed and Williams state the price (not the cost of production, which is what we want to get at) at 3*l.* 4s. for pig-iron of all kinds in 1864 and 1865. The cost in South Wales is far below this figure. At Grivegree, near Liege, the price of furnace coal (which, though small, is one of the purest in the basin) for puddling and re-heating is 12 francs, or about 10s. per ton. The quantity used to make 1 ton of puddled bars is from 1½ ton to 1 ton 16 cwts., according to the quality of the metal, forge pigs or grey metal. The loss in puddling is from 12 per cent. in forge pigs, to 16 per cent. in grey metal. The cost of labour is from 15 frs. (11s. 9d.) to 18 frs. (14s. 3d.) per ton. The number of charges, or heats, in 24 hours, is from 14 in forge pigs to 10 in grey metal. The iron is of good quality, and the best is used for drawing wire.

The Société d'Esperance has a mill and forge at Longdoy, near Liege. Their pig metal, made near Seraing, is of a quality much better than the average of the country. The cost of their coal in the puddling and reheating furnaces is 10s. 3½d. (13 frs.) per ton. The average quantity used to make a ton of puddled bars is 1 ton 4 cwts. The loss in puddling averages from 8 to 10 per cent., according to the metal, forge or grey pig. The cost in labour per ton of puddled bars is, on the average, 12 frs., or 10s. per ton. The number of heats, or charge, is 12 per 24 hours, on the average.

The puddling furnaces in Belgium are garnished with the oolitic ore, or oligiste. We have seen that this contains both phosphorus and phosphorus, which simply are the very impurities that is one of the objects of the process of puddling to remove. We consider this to be a disadvantage to the iron produce of Belgium for which no advantage can fully compensate. With the exception of the carbonate of iron found at Angleur, and so prized at Seraing, there is no ore in the country which can be used as a substitute for this oligiste.

LABOUR.—We now come to the most difficult and doubtful point of our subject—the cost and efficiency of labour employed in Belgium in the manufacture of iron. So long as it was an object and is the Belgian ironmasters to continue the protecting duties on pig metal and wrought iron, or even to increase them, we may be quite sure that the estimate of the price of labour was placed at as high a figure as possible; but now they have hopes raised of being able to compete successfully with the British masters, it is natural that they should rather underrate the price, with the double motive of scaring their rivals and of flattering the national vanity.

We observe it is stated by Messrs. Creed and Williams (Times, Dec. 27, 1866) that one or two (proprietors) were "found to be little suspicious, and somewhat chary of giving information," but "in the majority of instances every question was most frankly and fully answered, and everywhere we met with the utmost courtesy and attention." Did it never occur to these gentlemen to interpret the great readiness of communication of the latter by the light of the suspicion and chariness of the former? Let us recollect that the information was sought for the avowed purpose of publication, and then let us ask whether it is possible that a manufacturer would be willing to place at the disposal of his competitors at home as well as abroad the whole data of his business. The writer of these lines is well acquainted with the Belgians, their character and habits, and most certainly veracity is not among the qualities for which they are most distinguished. Add to this, that they are as a nation extremely vain and boastful, and we shall not be at a loss for good reasons for receiving with the greatest reserve the information which Messrs. Creed and Williams profess to have obtained. We think that, then turning upon an incident unimportant in itself, there is internal evidence in their report that the Belgian employees were trifling with them, if not positively quizzing them. They were told that after their work was over (Times, Dec. 24) "the colliers took a bath and changed their clothes." Was it a warm bath? If so, we hope the "patrons" were sufficiently considerate and humane to establish a public bath, and supply it with the waste water of the steam-engine. We know one colliery where this is done certainly, but unhappily the price of admission (about 4½d. English) is far above the means of a poor collier; and for the rest, the noisome atmosphere of their dwellings, white as may be the exterior, is not exactly suggestive of cleanly habits in other respects. As to a cold bath, *horresco referens*, we were once (not long ago) waited upon in lodgings by a girl who had worked in collieries, and nothing so excited her astonishment as our diurnal cold ablutions before dressing. We, therefore, cannot shake off a shrewd suspicion that this was a *mauvaise plaisanterie* practised upon "Messieurs les Anglais;" but, if so, how can we be sure that other information was more trustworthy?

* Being the Newcastle Prize Assay firs published in 1867, and now reprinted because indicating the direction whence an improvement in our iron industry may be looked for.

* Dose, 20 cwts. per 21 cwts. of metal, at Seraing.

† a. Carbonic acid, 42 per 100; lime, 5·54; magnesia, 0·04; oxide of iron and clay, 0·04; acid carbonic, 4·38; total, 10·00.

b. Carbonic acid, 43½ per cent.; lime, 5·58; magnesia, 0·04; oxide of iron and clay, 0·02; acid carbonic, 4·36; total, 10·00.

IRON AND MANGANIFEROUS ORES.—Messrs. H. BORNER and [illegible] (Cardiff, July 23) write:—The iron ore market exhibits more firmness this week and higher prices have been paid. Ore will continue to become dearer as the Spanish authorities make the quarantine regulations less stringent. Freights from Bilbao are 5s. to Cardiff or Newport. Rubio ore is quoted 11s. c.i.f. Cardiff or Newport, with guarantee of 50 per cent. Demand for manganiferous ores shows no improvement. Manganese is steady at 1s. 4d. per unit c.i.f. Cardiff or Liverpool.

TEXAS—ITS RAILWAYS, ITS RANCHES, AND ITS MINERAL WEALTH.

The want of appreciation on the part of British capitalists of some of the ranch companies which have recently been placed upon the London market is to a great extent explained by the details given by Consul Bridgett, of Galveston, since it appears that the days of profitable ranching are rapidly passing away, if they be not gone already; as the State becomes populated ranching becomes unprofitable. At present the railways in operation throughout Texas show a mileage of 6139, but these lines are not all of the same gauge; the great majority are of 4 ft. 8½ in. gauge, but some are 3 ft. gauge. Up to recently the State assisted the construction of railways by giving 16 sections of land for every mile constructed, but the public domain being exhausted the new roads get no assistance from the State. The railroads are calculated to give employment to about 16,000 persons, and during 12 months carry freight to the amount of 3,000,000 tons. The Legislature passed a law fixing the rate of passenger fares at 3 c. per mile, and this rate prevails throughout the State. There is a State inspection of railroads, but no Board of Railway Commissioners. Most of the railways possess lands for sale, and as the State Constitution does not allow money to be spent in aiding immigration the various companies do their best by advertisements and other means to foment the arrival of new settlers. They not unfrequently organise excursions from the older States, furnishing free transport, so that those interested may have a chance of seeing Texas, and forming an estimate of its capabilities and resources. The agent in London of one railway is inclined to represent Texas in too glowing colours, and encourages many to come here who should never leave their native country. The State takes no steps to attract immigration, but numbers are finding their way here from the States of Tennessee, Mississippi, Georgia, and Arkansas; many also come from Ohio, Indiana, and Illinois, but of their number no record is kept. There are also large arrivals of immigrants from Germany and Bohemia, who come to join their relatives and friends. There are towns in Texas where German is the language used, to the almost entire exclusion of English. This is a good country for men with a small capital accustomed to farming, and also for those who have learnt a trade, such as carpenters, blacksmiths, stonemasons, and bricklayers; men capable of doing fine work in the last-named occupation have of late been earning 25s. per day. Young men from a desk in an office, unacquainted with country life, and unaccustomed to manual labour, had better stay at home; many such are induced to come here, and the result is they become "loafers," and rapidly descend in the social scale.

Five millions is the estimate of the number of cattle at present existing in Texas. The rearing of these animals has been for the last three or four years a business of great profit, and various calculations are put forward showing what must be the profit of the owners of cattle, simply by natural increase. Many of these animals are fed on "free range"—their food costs nothing, as the owners pasture them on unsettled lands. With the increased value of land this system is likely to cease. Many persons have been fencing in land, and at the same time closing access to land which does not belong to them. To those accustomed to graze their cattle free of rent the fencing has caused much annoyance, and they retaliate by cutting and destroying the fences. The Legislature now in session is debating the measures necessary to be adopted to prevent these outrages, as the offer of rewards by the Governor for the detection of the fence cutters has proved of no avail. Texas is well adapted for cattle breeding, and every season large numbers of young animals are driven north to the States of Kansas, Missouri, Illinois, Colorado, Nebraska, and other States, where they are fattened for the Eastern and European markets. Owing to the fencing, which is rapidly extending in the north of Texas, the northern "drive" is no longer open, and quite lately owners of cattle are finding it more to their interest to ship cattle by railway, as the animals lose less in flesh. Another favouring cause of profit is that cattle, which formerly no banker would think of taking as security for advances, can now be readily pledged. The improvement of the breed of cattle is having more attention, as cattlemen find it to their advantage to raise the grade of their animals, as they hereby obtain earlier maturity and a heavier animal.

A new phase of the cattle business is the slaughtering of animals in Texas, and sending then in refrigerator cars by railway to the places of consumption. This has been carried on to a large extent last year between the town of Victoria and New Orleans, and other places. A similar business is being started in the town of Fort Worth. All shrinkage by travel is thus avoided, and the meat arrives in better condition. While Texas cattle find their way to England by way of Kansas City and Chicago, and thence to Boston and New York, nothing seems to be done to organise a direct trade hence to England, which is only eight days longer sea voyage. Australia and the Argentine Republic are shipping frozen meat to Europe, while Texas remains idle. With such an immense demand in England and elsewhere for cheap beef, there seems here to be an opening for any one desirous of striking out in a new line. In former years schemes for shipment of live cattle have been attempted, but have failed for want of capital or proper organisation.

Sheep farming is another large interest in Western and South-Western Texas, but owing to the severe winter of 1882-83, with its constant changes, and a greater proportion than usual of cold rains, received somewhat of a check, and many inexperienced wool growers suffered severe losses. As in all other business occupations, sheep farming requires experience, and a careful attention to the requirements of the animals. Some persons think they have only to turn a flock of sheep loose on the prairie, and that they will increase and multiply, and furnish a crop of wool in spring and autumn. Such persons soon find out their error. The recent change in the Customs' tariff on wool, and the over-production of woollen goods, has caused the market for wool to be dull, and the price of the staple has been reduced 15 to 20 per cent. The assessment rolls for 1882 give the number of sheep 3,771,000, and the value put upon them is $7,000,000 (1,456,000*l.*). Horses and mules do well anywhere in the State, but the largest horse ranches are in Western and South-Western Texas. These animals are noted for their hardihood and powers of endurance. Blood stock is also being raised by several breeders, and it is claimed by them that parts of Texas are equal, if not superior, to the blue-grass region of Kentucky. The number of horses and mules in the State is very close to a million, with a value of $22,680,000 (4,717,000*l.*).

Texas has a large amount of mineral lands, but as yet little use has been made of them. The chief minerals are coal, iron, and copper. Coal crops out in several sections of the country, and the area of the coal fields is estimated at 20,000 square miles. There is a coal mine at Laredo, in Webb county, and two others at Rockdale, in Milam county, but the greater portion of the coal consumed is brought either from England or the Northern States. Iron ore is abundant in many counties in Eastern Texas, but the only ironworks in operation are those at Kelleyville. Excellent marble is found near Paris, in Lamar county.

PERSIAN ROADS AND RAILWAYS.

With regard to railway schemes reference has already been made to the concession granted to a Frenchman, Mr. Boital, for the construction of a line of railway from Resht to Tehran. He has since obtained a further concession authorising him to prolong the railway as far as the Persian Gulf; to make such branch lines as may appear necessary in the interest of the undertaking in which he is engaged; and to work on his own account, subject to an understanding with the Minister for Mines, all mines within about six miles of either side of his line of railway. The caution money, 500,000 francs, as stipulated in the first concession, appears to have been duly paid over in Paris, and Mr. Boital has returned to that city to make further arrangements for obtaining the necessary funds for his undertaking.

The present concession is granted for 99 years, and the lines from Euzelli to Tehran, and from Tehran to Shabdul Azim, are to be open for traffic in the course of the year 1885. In the meantime, the Russian Government has issued a prohibition against the transit of foreign goods through the Caucasus; and it remains to be seen whether Mr. Boital will, under the circumstances, be able to give effect to the concession granted to him.

British trade, being deprived of this transit through the Caucasus, must necessarily have recourse to other directions; and this circumstance seems to offer an additional motive for the adoption, without further delay, of measures for facilitating the transport of merchandise by the southern or western routes of Persia. Mr. Dickson, Secretary of Legation at Tehran, does not think that Russian manufacturers have as yet, as has been apprehended, succeeded in seriously interfering with our Manchester goods, which form the largest portion of the import trade of Persia; though there are certain articles of minor importance, such as broad cloth, glass and hardware, tea, candles, &c., which are now principally brought from Russia; whilst sugar is mostly imported from France. If British trade here has not of late years been so flourishing as might be desired, the cause, he thinks, may be attributed not so much to foreign competition as to the impoverishment of the country since the terrible famine of 1871-72; to the failure for many consecutive years of the silk produce; to the unsatisfactory state of the Persian currency; and partly also to the want of energy generally displayed by provincial authorities in protecting foreign merchants against fraudulent debtors. But, if Persian routes continue to remain in their present condition, with the sole exception of the one which will be available only for the commerce of Russia, it is not unreasonable to expect that she will in time monopolise the foreign trade in Northern Persia.

With regard to the south of Persia, the necessity of having better means of communication appears to be now generally admitted. The point to be determined, however, is which would be the best line to adopt between Tehran and the Persian Gulf, and how the expense of construction would have to be met. The opinion of those who are seriously studying the question is that it would be wiser to commence with a serviceable cart road, or even a good mule track available for litters; and that when the amount of traffic could be ascertained it would then be time to consider whether a railway along the same line could not be advantageously substituted.

Economy points obviously to the direction where water-carriage may be made most available. It would, therefore, be a great boon to commerce if the Karoon were opened to navigation; but, unfortunately, the Shah has not yet been able to convince himself that the interests of this country would in every respect be benefited by such a concession. From some convenient point of this river a road might be constructed by Burujird to Tehran, thereby lessening to a considerable extent the difficulties now encountered between Bushire and Shiraz, to say nothing of the saving in distance.

An intelligent French engineer has conceived a scheme for establishing water communication between Kermanshah and Mohemmera by means of a system of canalisation connecting the Karasoo and Kerkha with the Karoon. If this project could be successfully carried out it would be necessary to complete it by a railway or tramway between Tehran and Kermanshah, which could be easily and cheaply constructed. It is in fact mainly in consideration of the comparative absence of engineering difficulties on this line that Mr. Dickson has hitherto advocated the construction of a railway to Baghdad in preference to any other, and he is still of opinion that if the Karoon is not to be utilised that would be the best route. A road for wheeled traffic, similar to the one now existing between Tehran and Cazvin, is being extended from Tehran to Koom in the direction of Ispahan. It is expected to be opened for traffic in the course of next winter. The distance, however, is in both cases too short to render them profitable; and it is feared, therefore, that for want of funds the necessary care will not be taken to keep these roads in proper repair.

Works of this nature should, he thinks—at any rate, for the first few years—be confided to an experienced European Company, who should engage, by a formal contract with the Persian Government, to maintain the roads and the requisite means of transport in proper working order.

ALEX. WILSON & CO.

VAUXHALL IRONWORKS,
L O N D O N , S. W.,
MANUFACTURERS OF
THE VAUXHALL DONKEY PUMPS.
THE EXCELSIOR DIRECT-ACTING PUMPS.

Air Compressors.
Winding Engines.
HOISTING MACHINERY.

ILLUSTRATED AND PRICED CATALOGUES ON APPLICATION.

PERFORATED SHEET METALS

FOR
TIN, LEAD AND COPPER MINES,

MILLERS, BREWERS, AND MALSTERS,
COLLIERIES AND QUARRIES,
COFFEE ROASTERS AND SUGAR REFINERS.

ALDRED & CO.,
WORKS: PARKER STREET, ASHLEY LANE, MANCHESTER

MACDERMOTT AND GLOVER'S PATENT
PERCUSSIVE ROCK PERFORATOR
(IMPROVED)
FOR HAND-LABOUR ONLY,
IN HARD ROCK.
FOR MINES, QUARRIES, AND GOVERNMENT CONTRACT WORK.

RATE OF PENETRATION IN GRANITE,
1½ to 2 inches per minute.

Price £50 complete.

For full particulars, apply to
GLOVER & HOBSON,
ENGINEERS & MILLWRIGHTS,
ALBERT IRONWORKS, ST. JAMES'S ROAD, OLD KENT ROAD, LONDON, S.E.,
SOLE MANUFACTURERS; OR TO—
M. MACDERMOTT, 25 and 26, Pudding Lane, London.
N.B.—A machine can always be seen at work (without notice) at the Albert Ironworks. [TELEPHONE 4664.]

CALIFORNIAN AND EUROPEAN AGENCY.
509. MONTGOMERY STREET, SAN FRANCISCO CAL.
J. JACKSON, Manager.

Now ready, price 25s., post free.
COMPOUND DIVISION COST SHEET READY RECKONER
Designed for effecting in minutes what has hitherto taken hours to accomplish,
For use in making out Cost Sheets of Collieries, Ironstone and other Mines, Iron, Gas, and Water Works, Quarries, and Manufactories generally.
For Accountants, Merchants, Public, and Private Offices.
By WILLIAM WETHERED.
This work is applicable to calculations where any number of articles cost is given sum, and the price of one of such number is required.
The circulation of such a book as this must necessarily be limited. It is doubtful whether it will pay more than the bare cost of publishing, allowing nothing for the enormous amount of labour such a mass of figures has occasioned. The price cannot be named at less than 25s., and it is not too much to say that where it can be applied its cost will be saved in a few weeks. It will be found invaluable to accountants generally.
Copies can now be had, and will be forwarded from the MINING JOURNAL Office on receipt of Post Office Order for the amount.

Just published, price 7s. 6d., post free.
TABLES FOR ASCERTAINING THE PRICE OF TIN ORE AT A GIVEN STANDARD AND PRODUCE:
To which is added Tables for Ascertaining the Value of any Quantity of Black Tin, from 1 lb. to 10 tons, at any price from £20 to £100 per ton.
Originally compiled and calculated by the late Mr. R. WELLINGTON; and now extended, reprinted by Mr. W. BAILEY, of Camborne, and carefully verified throughout.
London: MINING JOURNAL Office, 26, Fleet-street, E.C.; and may be had by order of all Booksellers.
Australia: GEORGE ROBERTSON, Melbourne, Sydney, Adelaide, and Brisbanne.

THE MINING RECORD, Only $5·00 a year.
Foreign Postage.
61, BROADWAY, NEW YORK.
the ONLY PAPER in the United States that gives FULL LATEST ACCOUNT from all the GREAT GOLD, SILVER, IRON, and COAL MINES of AMERICA.
ORDERS EXECUTED FOR MINING STOCKS. Information free
ALEX. ROBT. CHISOLM, Proprietor.
London Office—H. CARTER, Manager, 36, King William-street, London.

CINQUANTE ANS D'EXISTENCE.
THE MINING JOURNAL,
RAILWAY AND COMMERCIAL GAZETTE
(Journal des Mines de Londres; Gazette des Chemins de fer et du Commerce)
est le Journal le plus répandu parmi les Mineurs, les Maitres de forges, les Ingénieurs civils et des mines, les Financiers et les Commerçants de tous les pays du monde.

On traduit gratuitement en Anglais et rédige les annonces écrites en Français, en Allemand, etc., etc.

Les annonces et abonnements se paient par anticipation.
ABONNEMENT ANNUEL:
GRANDE-BRETAGNE, £1:4:0; UNION POSTALE, £1:8:0.
ONDRES: BUREAUX DU "MINING JOURNAL," 26, FLEET STREET, E.C., ANGLETERRE.

SAMUEL OSBORN AND CO.,
MANUFACTURERS OF TOUGHENED
CRUCIBLE STEEL CASTINGS
Of all descriptions of special strength and solidity.
ALSO, MANUFACTURERS OF
BEST CAST STEEL FOR ENGINEERS AND MINERS' PURPOSES; FILES; SAWS; HAMMERS; RAILWAY SPRINGS, &c.
STEEL SHEETS AND FORGINGS.
SOLE MAKERS OF
R. MUSHET'S CELEBRATED EXTRA BEST
TITANIC CAST STEEL FOR BORERS
And of R. Mushet's pecial Steel for Lathe and Planing Tools and Drills,
THE STEEL WHICH REQUIRES NO HARDENING.
CLYDE STEEL AND IRON WORKS, SHEFFIELD.

MINING MACHINERY,
MILLING MACHINERY

Of the MOST APPROVED AMERICAN PATTERNS.

GOLD MILLS.

The California pattern of Gold Stamp Mill is universally accepted as the most perfect, economic, and efficient made.

We have over 900 stamps in successful work in the various Western Gold Districts.

SILVER MILLS.

Silver amalgamation in Pans is essentially an American system evolved after years of work on the rich silver mines of Nevada.

We have over 500 Stamps, with necessary pans, settlers, roasting furnaces, &c., all of our own manufacture, at work in different silver camps of the United States, Mexico, and South America, and Phillipine Islands, Asia.

CONCENTRATION MILLS

Of the most approved German pattern and arrangement, or with Stamps and Frue Vanner Concentrators for low grade silver ores, light in lead. We have over 20 large German pattern mills at work on lead, zinc, or copper ores, and numerous Vanner mills on ores never before successfully concentrated.

Mining Pumps, Cornish pattern, of the largest sizes. **Hoisting Engines,** from 4 h.p. up to the largest direct-acting engines to sink 3000 feet.

SMELTING WORKS.

We have 80 Water Jacket Smelting Furnaces in use from 20 in. circular up to 54 in. by 60 in. for lead and silver smelting; and special High Jacket Furnaces for copper ores.

Engines of any size, plain slide valve, Corliss, compound Corliss, Boilers, all sizes. **Leaching Mills, Hallidie Wire Rope Tramways. Comet Crusher,** with capacity of 12 to 20 tons per hour. **White, Howell. Bruckner, and Stetefeldt Roasting Furnaces, &c.**

We have had twenty years experience in the manufacture solely of MINING MACHINERY, and have special facilities for shipping to all foreign parts through our New York Office, where all details of clearance, shipment, and insurance are conducted. Our machinery is already well known in Mexico, Peru, Chili, Venezuela, Honduras, and other South American countries.

Correspondence solicited. Descriptive Circulars and Catalogues on application

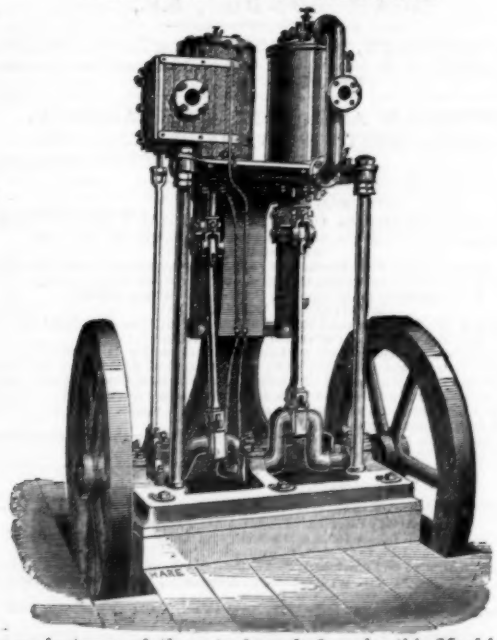
FRASER AND CHALMERS.

PRINCIPAL OFFICE AND WORKS.	NEW YORK OFFICE.
Fulton and Union Streets, Chicago, Ill, U.S.	No. 2, Wall Street, New York, U.S.

COLORADO OFFICE—CHEESMAN BLOCK, DENVER.

THE

"Champion" Rock-borer
AND AIR COMPRESSOR.



As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stoping done by contract by the Proprietor with his own Machinery now amounts to over 1150 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons in weight may be seen in constant work in the Camborne Mining District.

R. H. HARRIS,
ENGINEER,
63, QUEEN VICTORIA STREET, LONDON.

KIRKSTALL, BOWLING, AND STAFFORDSHIRE BAR IRON

RAILS — RAILS — RAILS —

New, slightly defective.

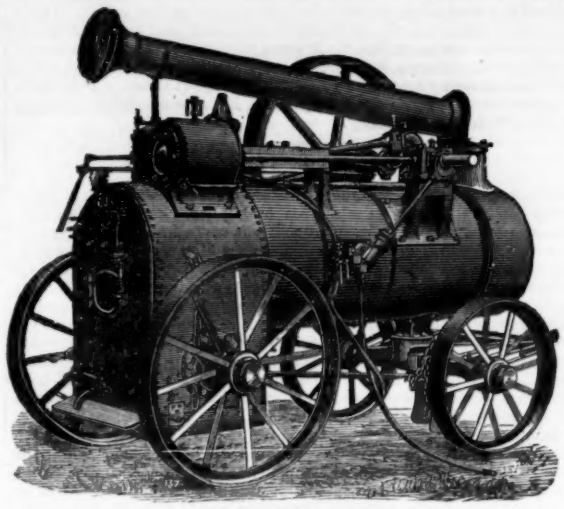
F.B. SECTION—BULL HEAD—DOUBLE HEAD—
10, 12, 14, 16, 18, 20, 24, 30, 40, 50, 60, 70, 75, 80 lb. per yard.
Sections on application to

WILLIAM FIRTH, WATER LANE, LEEDS.

POINT and CROSSINGS with all Fittings complete.
2500 tons in stock ready for delivery.

CLAYTON AND SHUTTLEWORTH,
STAMP END WORKS, LINCOLN, AND 78, LOMBARD STREET, LONDON.

☞ *The Royal Agricultural Society of England have awarded Every First Prize to CLAYTON and SHUTTLEWORTH for Portable and other Steam Engines since* 1863, *and Prizes at every Meeting at which they have competed since* 1849.



Steam Engines, portable & fixed,
For Coals, Wood, Straw, and every kind of Fuel.
OVER 21,500 SOLD.

Thrashing Machines.
OVER 19,500 SOLD.

Straw, Corn, and Hay Elevators.

Chaff Cutters for Steam Power.

Grinding Mills.

Saw Benches.

Traction Engines, &c.

GOLD MEDAL AND FIRST CLASS CERTIFICATE at the Calcutta International Exhibition 1883-4.
THE ONLY GOLD MEDAL
AWARDED FOR
PORTABLE STEAM ENGINES.

GOLD MEDALS AND OTHER PRIZES have been awarded to CLAYTON AND SHUTTLEWORTH at all the important International and Colonial Exhibitions, including
LONDON, 1851 and 1862;
PARIS, 1855, 1867, and 1878;
VIENNA, 1857, 1866, and 1873.

Catalogues in English and all European Languages free on application.

THOMAS TURTON AND SONS,

MANUFACTURERS OF

Cast Steel for Mining and other Tools, Shear, Blister, and Spring Steel

FILES OF SUPERIOR QUALITY.

EDGE TOOLS, HAMMERS, PICKS, AND ALL KINDS OF TOOLS FOR RAILWAYS, COLLIERIES, ENGINEERS, AND CONTRACTORS
LOCOMOTIVE ENGINE, RAILWAY CARRIAGE, AND WAGON SPRINGS AND BUFFERS.

SHEAF WORKS, AND SPRING WORKS, SHEFFIELD.

LONDON OFFICES:—90, CANNON STREET, E.C.

POTENTITE.

This unrivalled Explosive, as manufactured by the **New and Perfected Machinery** of the Company, is perfectly safe for transit, storage, and use, and is employed in every description of Mining or Quarrying Work, for Tunnelling, Pit Sinking, Engineering Work, and Submarine Operations, with the most complete success and satisfaction.

Potentite does NOT contain its own MEANS OF IGNITION, is free from Nitro-Glycerine, and its SAFETY has been specially demonstrated by public experiments.

Its strength is unequalled. Its action is certain.

In action it gives off neither flame, smoke, nor offensive smell. By its use labour is economised, as work can be resumed immediately after the shot is fired.

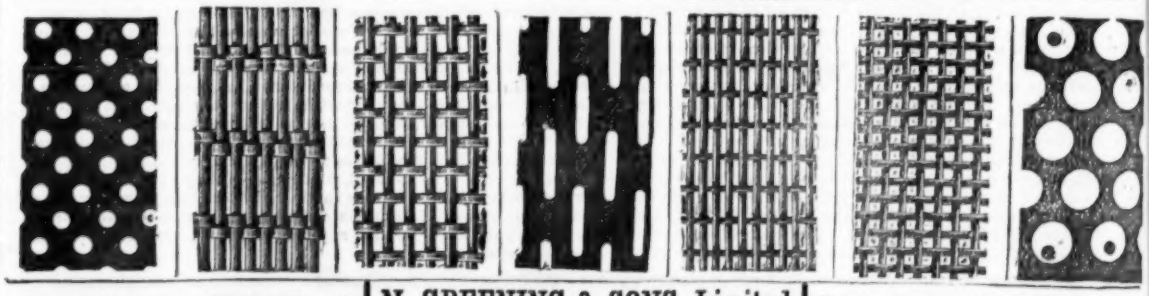
POTENTITE is specially adapted for export to hot climates, as it is unaffected by heat, and is free from dangerous exudations.

POTENTITE IS THE SAFEST STRONGEST, AND WORK FOR WORK, CHEAPEST EXPLOSIVE IN THE MARKET.

For particulars and prices, apply to—

THE POTENTITE COMPANY, LIMITED.

HEAD OFFICE—3, FENCHURCH AVENUE, LONDON, E.C.



Extra Treble Strong Wire Cloth and Perforated Metals in Steel, Iron, Copper, Brass, Zinc, Bronze.

Made in all Meshes and Widths.

N. GREENING & SONS, Limited,

Wire Manufacturers and Metal Perforators,

WARRINGTON.

Jigger Bottoms, Trommels, Cylinder Covers, Riddles, Sieves for Diamond, Gold, Silver, Copper, Lead and Tin Mines.

Samples and Prices free on application.

FRANCIS MORTON AND CO., LIMITED, LIVERPOOL,

MANUFACTURERS OF

GALVANISED CORRUGATED IRON ROOFS, BUILDINGS, AND SHEDDING,

WHICH THEY HAVE EXTENSIVELY ERECTED FOR THE REQUIREMENTS OF

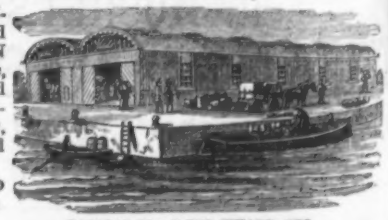
Forges, Rolling Mills, Puddling Sheds, Ironworks, and Collieries

Erected Complete in this Country, or prepared to Plan for Erection Abroad,

OPEN SHED FOR COVERING LARGE AREAS

GALVANISED OR PAINTED CORRUGATED IRON ROOFING PLATES and TILES. HEAVY CORRUGATED IRON PLATES for fireproof floors, roadways, parapets, &c. (for producing which F. M and Co. have recently laid down powerful Hydraulic Machinery). Wrought-iron Tanks, Guttering, and General Constructional Wrought Ironwork.

DESIGNS PREPARED, AND ILLUSTRATED DESCRIPTIVE CATALOGUES FORWARDED ON APPLICATION

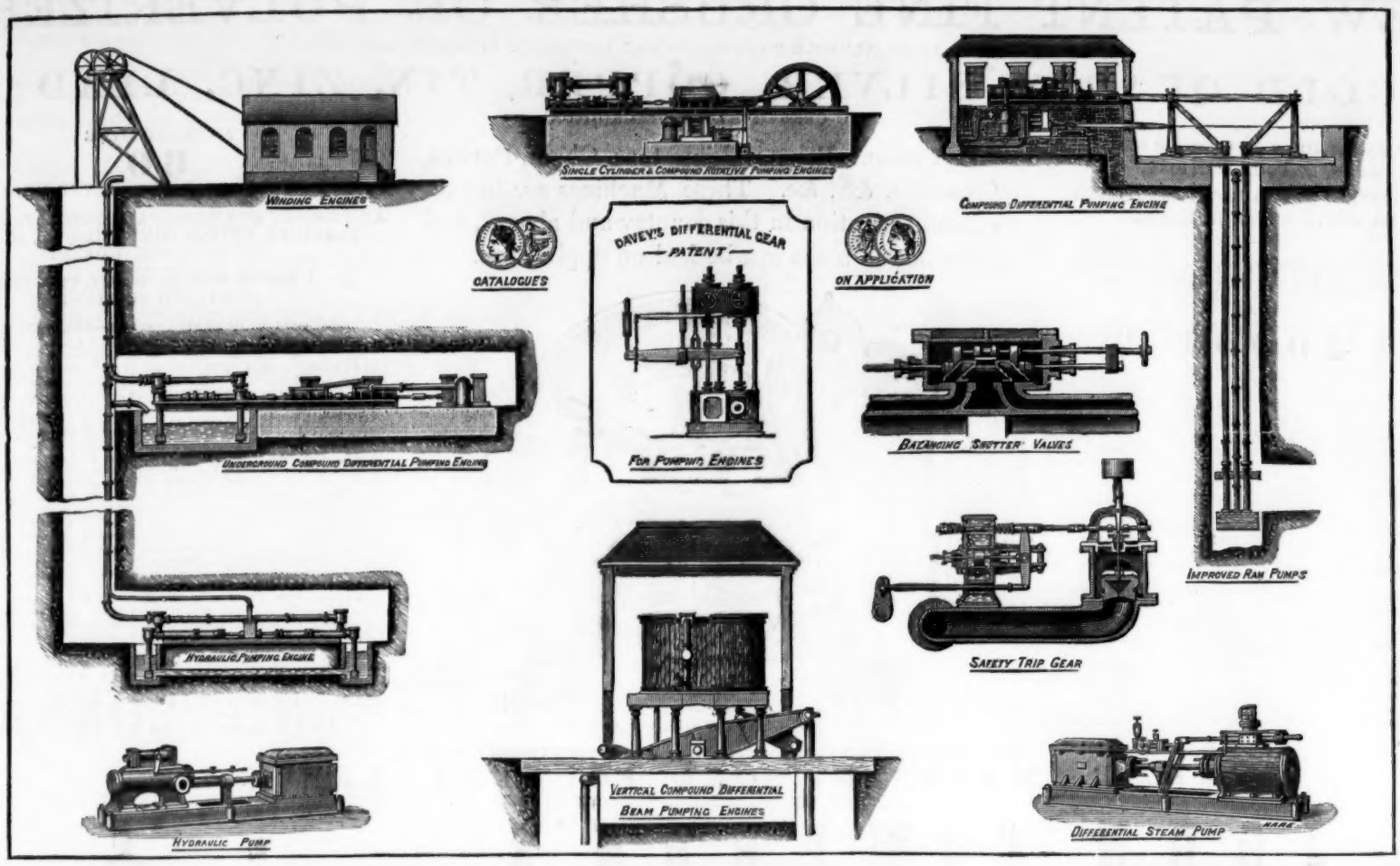


GENERAL STORE FOR WHARF, ETC.

London Office: 9, Victoria Chambers, Victoria Street), Westminster, S.W.
(Rooms Nos. 27 and 28, on the First Floor.)

HATHORN, DAVEY & CO.,

PUMPING MACHINERY. MINING MACHINERY.



SUN FOUNDRY, LEEDS.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines.

The following testimonials refer to this Packing:—

New Zealand Shipping Co. (Limited),
S.S. "Ruapehu," Royal Albert Dock, 19th May, 1884.

Bell's Asbestos Works, Southwark.

GENTLEMEN,—I beg to state that your round Asbestos Block Packing was used in the high-pressure pistons of this ship with the following remarkable results:—

14,000 miles continuous steaming without renewal.
Steam pressure ... ... 110 lbs.
Vacuum ... ... 29 inches.

My experience does not show an equal result from any other packing. The voyage from New Zealand to Plymouth was accomplished in 27 days 22 hours, being the fastest run from New Zealand on record. Yours obediently, D. HENDERSON, Chief Engineer, S.S. "Ruapehu."

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory. Yours truly,

Mr. J. Bell. G. H. CLARKE, Sup. Engineer.,

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

To Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; 1/4 in., 60 per cent.; 1/2 in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING
for Locomotives and all Stationary Engines running at very high speed with intense friction. Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.

DEAR SIRS,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,

THOMAS WINTER, Colliery Engineer.

TRADE MARK.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.

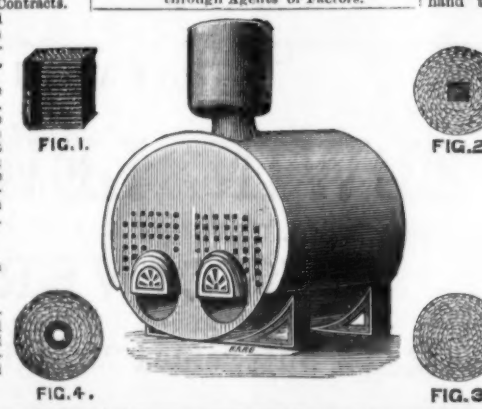


FIG. 1.

FIG. 2

FIG. 4.

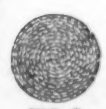


FIG. 3.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering. Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),

Mr. John Bell, Southwark, S.E. Gunnislake, Tavistock, 8th April, 1884.

SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc. M. Inst. C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from 1/2 in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and 1/2 millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts.
Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT). This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S "ASBESTOS LUBRICANT."

"REGD"

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.

THE BLAKE-MARSDEN NEW PATENT IMPROVED STONE BREAKERS AND ORE CRUSHERS.

ORIGINAL PATENTEE AND ONLY MAKER.

H. R. MARSDEN,

ALSO PATENTEE AND ONLY MAKER OF THE

NEW PATENT FINE CRUSHER OR PULVERIZER,

FOR REDUCING TO AN IMPALPABLE POWDER, OR ANY DEGREE OF FINENESS REQUIRED,

GOLD QUARTZ, SILVER, COPPER, TIN, ZINC, LEAD

AND ORES OF EVERY DESCRIPTION

PATENT REVERSIBLE CUBING and CRUSHING JAWS, IN FOUR SECTIONS,

WITH PATENT FACED BACKS, REQUIRING NO WHITE METAL IN FIXING.

CRUCIBLE CAST-STEEL CONNECTING RODS. RENEWABLE TOGGLE CUSHIONS, &c.

OVER **4000** IN USE.

EXTRACTS FROM TESTIMONIALS.

PULVERIZER.

I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

"In reply to your favour, I have much pleasure in informing you that the 12×3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

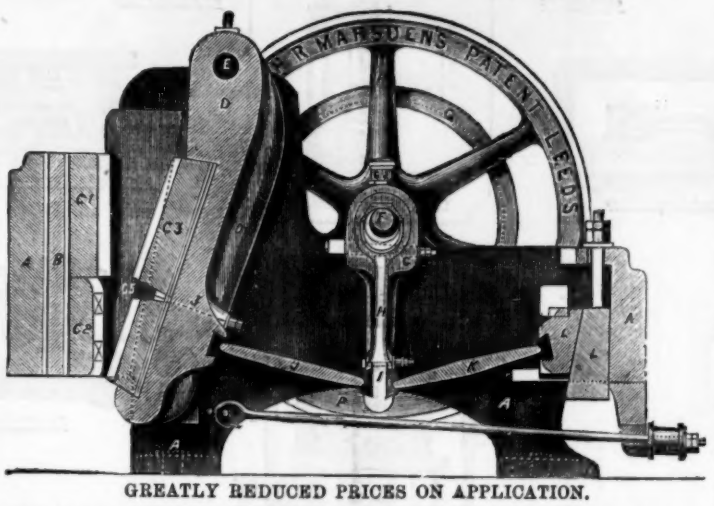
"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20×5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried *by hand*, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer."

"I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."

Also Cement, Barytes, Limestone, Chalk, Pyrites, Coprolite, &c., &c. These Machines are in successful operation in this country and abroad, and reference to users can be had on application.



GREATLY REDUCED PRICES ON APPLICATION.

AWARDED OVER

60

FIRST-CLASS GOLD AND SILVER MEDALS.

ADOPTED BY THE PRINCIPAL CORPORATIONS, CONTRACTORS, MINING COMPANIES, &c., IN ALL PARTS OF THE WORLD.

ROAD METAL BROKEN EQUAL TO HAND, AT ONE-TENTH THE COST.

EXTRACTS FROM TESTIMONIALS.—STONEBREAKER.

"I now order Three of your Stone Crushers, size 15 × 10, to be your very best construction, and to include two extra sets of Jaws and Cheeks for each. The last two 24×13 machines you sent us which are at work in this colony, are doing very well. You will soon find that the railway contractors will adopt your machines in preference to the colonial ones—two of which I have. I know other contractors have had as many as nine of them, which have not given very good satisfaction. Once they know of yours thoroughly, I believe you will do a good trade with the colonies. For reference to the high character of your constructions you can refer to many having used them with the very best results, both in New Zealand and this colony, and much prefer them to the colonial article, both in point of construction and less liability to go out of order. The material we are crushing is very hard blue stone, for railway ballast purposes. Push on with the order as quickly as possible; I do not think it necessary to have any engineering inspection. I have brought your machines prominently under the notice of all large contractors in this colony, likewise the Government. Many of the contractors have spoken to me in reference to their capabilities, and I could only tell them that they are by far and away the best and most economical I ever used. The very fact of me having purchased now Eleven from you at various intervals and various sizes, and two above 12 years ago, and having tried all the other makers, is sufficient guarantee of the capabilities and the working of your machines. Yours in every way surpass all others."

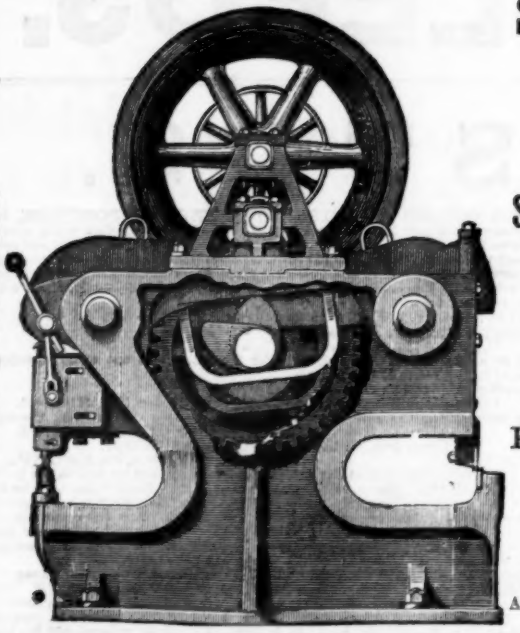
"Some of your testimonials do not give your machines half the due. I have seen men hammering away on a big rock for a quarter of a day which your machine would reduce to the required size in a quarter of a minute. I would guarantee that your largest size machine would reduce more of the Cornish tin capels (which is the hardest rock of England) in a day than 200 men, and at 1-20th the cost."

FOR CATALOGUES, TESTIMONIALS, &c., APPLY TO THE SOLE MAKER,

H. R. MARSDEN, SOHO FOUNDRY, LEEDS.

JOHN CAMERON'S

FLY-WHEELS ON BOTH SIDES.



DISENGAGING APPARATUS.

SPECIALITIES ARE HIS

STEAM PUMPS

FOR

COLLIERY PURPOSES.

Specially adapted for forcing Water any height

ALSO, FOR

SINKING, FEEDING BOILERS AND STEAM FIRE ENGINES,

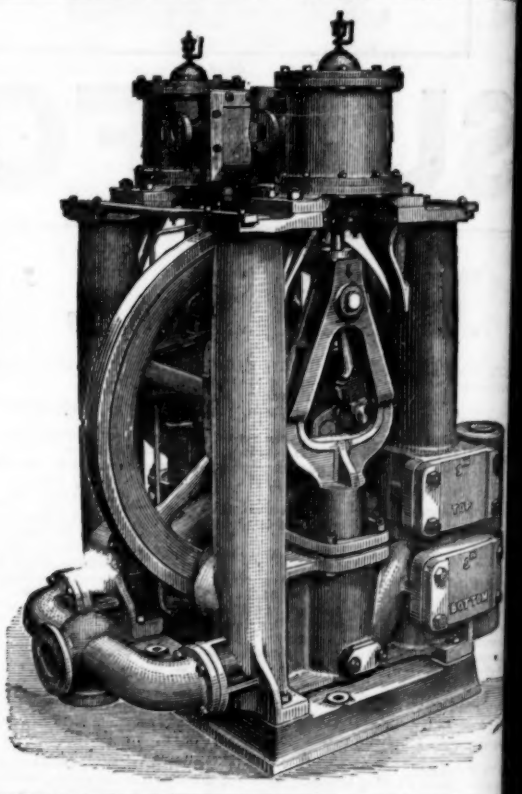
Of which he has made over 9000.

ALSO, HIS

PATENT CAM AND LEVER PUNCHING AND SHEARING MACHINES.

Works: Oldfield Road, Salford, Manchester.

AGENTS { For LONDON and DISTRICT—PRICE and BELSHAM, 52, QUEEN VICTORIA STREET, E.C.
For NEWCASTLE and EAST COAST—E. BECKWITH AND CO., BONNERSFIELD, SUNDERLAND.



HEPBURNS' PUMP LEATHER WATERPROOF

By a special method of preparation this leather is made solid, perfectly close in texture, and impermeable to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of—

HEPBURN AND GALE, LIMITED,
TANNERS AND CURRIERS,
LEATHER MILL BAND AND HOSE PIPE MANUFACTURERS,
LONG LANE, SOUTHWARK, LONDON.
Prize Medals, 1851, 1855, 1878, for
MILL BANDS, HOSE, AND LEATHER FOR MACHINERY PURPOSES.

W. F. STANLEY

MATHEMATICAL INSTRUMENT MANUFACTURER TO H.M. GOVERNMENT, COUNCIL OF INDIA, SCIENCE AND ART DEPARTMENT, ADMIRALTY, &c.

MATHEMATICAL, DRAWING and SURVEYING INSTRUMENTS of every description, of the highest quality and finish, at the most moderate prices.
Price List post free.
ENGINE DIVIDER TO THE TRADE.
ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.

THE IRON AND COAL TRADES REVIEW

The IRON AND COAL TRADES' REVIEW is extensively circulated amongst the Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron and coal districts. It is, therefore, one of the leading organs for advertising every description of Iron Manufactures, Machinery, New Inventions, and all matters relating to the Iron Coal, Hardware, Engineering, and Metal Trades in general
Offices of the Review: 342, Strand, W.C.
Remittances payable to W. T. Pringle.

ESTABLISHED 1825.

EDWIN LEWIS AND SONS,

Patent Tube Works, MONMORE GREEN and Britannia Boiler Tube Works, ETTINGSHALL

WOLVERHAMPTON.

MANUFACTURERS OF

Lapwelded & Buttwelded Wrought-iron, Steel, or Homogeneous Tubes

FOR EVERY

COLLIERY OR MINING PURPOSE.

J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES, FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions

WELDED STEEL CHAINS { FOR CRANES, INCLINES, MINES, &c., MADE ALL SIZES.

Printed by RICHARD MIDDLETON, and Published by HENRY ENGLISH (the Proprietors), at their Offices, 26, FLEET STREET, where all communications are requested to be addressed.—*July 26, 1884*